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ILLINOIS LOCAL GOVERNMENT

911 PLANNING MANUAL

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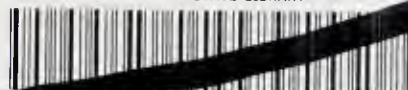
SRI Project 4477

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SUMMARY

This planning manual is one of three documents prepared by Stanford Research Institute under contract to the Illinois Commerce Commission (ICC). This study was financially aided by Grant #1717 from the Illinois Law Enforcement Commission. It provides the basic information and guidance needed by local governments and agencies in their planning for the implementation of the emergency number, 911 (Nine-One-One), communications systems. These systems provide a major benefit to citizens by assuring them instant contact with emergency service agencies through one telephone number. The development of such systems was mandated by the Illinois Legislature in Public Act 79-1092. This manual provides assistance to the local areas by describing planning steps that provide maximum flexibility in developing the best 911 systems for their areas.

Detailed descriptions of eight planning steps are contained in this manual. Each of these steps should be the subject of at least one two-hour meeting, with more complicated local situations possibly requiring several such meetings for some of the steps. Sufficient time should be provided between meetings so that all information needed for the upcoming meetings can be prepared. The eight planning steps are:

1. Form local 911 committees from local government, public safety, and telephone company personnel, state public safety personnel (ISP, forestry, etc.), and ICC personnel.
2. Evaluate the local jurisdictional, public safety, and telephone situations to establish a basis for further 911 planning steps.
3. Study 911 call handling techniques and operating and technical standards to determine how they match local needs for 911 systems.
4. Determine several potential 911 systems and answering points that meet the needs of the local area.
5. Determine the best form for managing the 911 systems.
6. Select from the potential 911 systems, developed in step 4, the system that best matches the local requirements.
7. Prepare a preliminary 911 plan and submit it to the ICC and the telephone companies.

8. Continue 911 activity including preparation of the final 911 plans, until 911 systems have been implemented.

Included in this planning manual, for use by 911 committees, are over 400 local alternative 911 systems. The method used in developing these alternatives is described so that the local 911 committees can develop additional alternatives, if desired.

The ICC will provide continuing assistance to local 911 committees in the development of 911 plans. Additionally, they will provide updating of this manual and information on any changes in the Illinois 911 situation.

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GLOSSARY

ACD - (See AUTOMATIC CALL DISTRIBUTOR).

ALI - Automatic Location Identification: Identifies location (address) of point of origin of the call.

ANI - Automatic Number Identification: Equipment in a central office for recording the calling party's telephone number without operator intervention.

AREA CODE - The three-digit code used when dialing calls from one Numbering Plan Area (NPA) to another.

AUDIBLE SIGNAL - Buzzer or bell to indicate an incoming call.

AUTOMATIC CALL DISTRIBUTOR - Equipment to distribute large volumes of incoming calls in approximate order of arrival to call answerers not already working on calls, or to "store" calls until call answerers become available.

AUTOMATIC CALL ROUTING - (See SELECTIVE ROUTING).

BASE RATE - The established telephone exchange service rate, exclusive of mileage, for main telephone, auxiliary line, or trunk line service.

BASE RATE AREA - That portion of the exchange area within which exchange service, other than rural line service, is offered at base rates for each grade of service without mileage or highway construction charges.

BASIC SYSTEM - A telephone service which automatically connects a person dialing the digits "911" to an established public safety answering point through normal telephone service facilities.

BUSY HOUR - The busiest hour of the busiest day of a normal week.

B.H. - (See Busy Hour).

CAD - (See COMPUTER AIDED DISPATCH).

CALL ANSWERER - The initial answerer of a 911 call.

CALL REFERRAL METHOD - Calling party is referred to a secondary number.

CALL RELAY METHOD - The call is answered at the PSAP where the pertinent information is gathered and then the call answerer relays that information to the proper public safety agency for its action. This can be accomplished by radio, intercom, telephone, etc.

CALL TRANSFER METHOD - The PSAP call answerer determines the proper responding agency and connects the user to that agency. To perform the necessary dispatching in accordance with prearranged plans with cooperating agencies.

CALLED PARTY HOLD - Enables the public safety answering point to control the connection for confirmation and tracing of a call.

CENTRAL OFFICE - Sometimes called a wire center; the smallest subdivision within the telephone system which has relatively permanent geographic boundaries.

CENTRAL OFFICE IDENTIFICATION - When an answering point serves more than one central office area, it is possible to identify the central office forwarding the call by dedicated (direct) trunking from the central office to the PSAP.

CENTREX - A type of private branch exchange in which incoming calls can be dialed direct to any extension without an operator's assistance. Outgoing and intercom calls are dialed direct by the extension users.

CNIL -Calling Number Identification and Location: sometimes used by the telephone industry in referring to the combination of automatic number identification and automatic location identification.

CO - (See CENTRAL OFFICE).

COMMON CONTROL - A type of dial telephone switching in which the dialed digits are stored temporarily in a sub-set of equipment that is shared by all of the line and trunk terminations; this sub-set of control is used only in setting up the connections and then goes to the next request for connection service.

COMPUTER AIDED DISPATCH (CAD) - The normal operations of handling requests for service from the public are assisted by making use of the special capabilities of a computer.

CONNECTING ARRANGEMENT INTERFACE - A protective device between Telco equipment and Customer Owned and Maintained (COAM) equipment.

DDD - Direct Distance Dialing: Telephone service which permits subscribers to dial their own long distance calls.

DIAL TONE FIRST - Allowance of 911 or "O" Operator calls to be completed from a pay phone without the deposit of a coin.

DIRECT PROGRESSIVE CONTROL - A type of dial telephone switching in which the dialed digits control the electromechanical switches (e.g., Step-by-Step or XY) to activate the connection through the apparatus; the switches used remain connected for the length of the call.

DIRECT DISPATCH METHOD - All 911 call answering and radio dispatching is done by the personnel at the public safety answering point.

DIRECT TRUNKING - An arrangement where a telephone line connection has no intermediate points before reaching the final destination (called) party.

DISPATCH POINT - The location from which a public safety agency's mobile units are dispatched.

EAS - Extended Area Service: Telephone service that allows subscribers in an exchange area to pay flat monthly or measured rates instead of long distance charges for calls to nearby exchange areas. See EXCHANGE.

EAX - Electronic Automatic Exchange: A central office with programmable phone switching logic.

EM - Emergency Medical.

EMS - Emergency Medical Services.

ESS - Electronic Switching System: A central office with programmable phone switching logic.

EXCHANGE - A defined area, served by one or more telephone central offices, within which the telephone company furnishes service.

FORCED DISCONNECT - The capability of the 911 center to disconnect a 911 call to avoid caller jamming of the incoming phone lines.

FOREIGN EXCHANGE SERVICE - A telephone line associated with an exchange foreign to the exchange in which it is installed.

HB 911 (1975) - The Illinois Assembly Bill requiring the implementation of 911 throughout the State by December 31, 1985. Now Public Act (PA) 79-1092.

ICC - Illinois Commerce Commission.

ILEC - Illinois Law Enforcement Commission.

ISP - Illinois State Police.

ITA - Illinois Telephone Association.

KEY TELEPHONE EQUIPMENT - An instrument that has the capability of multiple line terminations. Each line is accessed by depressing associated button (key).

LOCAL SERVICE AREA - The area that can be called without incurring multmessage units or a toll charge.

MAIN STATION - A telephone station that is connected directly to a central office and has a unique telephone number. It is not an extension station.

MULTIJURISDICTIONAL SYSTEM - A system covering more than one political boundary or agency.

MULTI-PARTY LINE - A local subscriber line terminating on the switching equipment that serves two or more main subscriber locations, requiring special equipment for discriminatory ringing and obtaining the correct number for billing.

NETWORK - 1. A series of points interconnected by communications channels.
2. The switched telephone network is the network of telephone lines normally used for dialed telephone calls.
3. A private line network is a network of communications channels confined to the use of one customer.

911 CENTER - Sometimes called a PSAP; the initial answering location of a 911 call.

NO-COIN DIALING - (See DIAL TONE FIRST).

ONI - Operator Number Identification: A method for obtaining the subscribers telephone number for billing long distance charges whereby the special long distance trunks go through an operator temporarily so she can input the calling number into the automatic billing equipment.

PBX - Private Branch Exchange: A telephone switchboard with many stations not individually identifiable to the telephone company's switching network.

PREFIX - The first three digits of a local seven-digit telephone number.

PRIVATE LINE - A telephone line which is used only for communication between two points, and which does not connect with the public telephone system.

PSAP - Public Safety Answering Point: Sometimes called a 911 center; the initial answering location of a 911 call.

PUBLIC AGENCY - "Public agency" means the state and any city, county, city and county, municipal corporation, public district, or public authority located in whole or in part within Illinois which provides or has authority to provide firefighting, police, medical, or other emergency services.

PUBLIC SAFETY AGENCY - "Public safety agency" means a functional division of a public agency which provides firefighting, police, medical, or other emergency services.

RINGBACK - Permits the answering point to ring the hung up telephone on a held circuit.

SELECTIVE ROUTING - Selective routing terminates a call at a PSAP determined by the location of the calling telephone. This is accomplished by using a computer to process the calling telephone number.

SOPHISTICATED SYSTEM - A basic system with the additional capability of automatic identification of the caller's number, holding the incoming call, reconnection on the same telephone line, clearing a telephone line, or automatic call routing or combinations of such capabilities.

SRI - Stanford Research Institute.

STORED PROGRAM CONTROL OFFICE - (See EAX and ESS).

STEP-BY-STEP - Any type of electromechanical switches used in a switching equipment where the (dial) pulses cause vertical and/or horizontal movement of contact switches to select and connect the input to an output line; generally two to four "stages" of switches are used in a local office connection.

SWITCHED NETWORK - A complex of diversified channels and equipment that automatically routes communications between the calling and called person or data equipment.

TANDEM TRUNKING - An arrangement where a telephone line connection has one or more intermediate points that are required or permitted (usually on a controlled dial pulse basis) before reaching the final destination (called) party.

TELEPHONE LINE - A telephone line from a telephone company central office that is connected to key or non-key telephone equipment.

TELCO - Telephone Company.

TRUNK - A circuit used for connecting a subscriber in a central office to all other services in/out of the switching equipment (e.g., 911 Trunk, Long Distance Trunk, Operator Trunk, Recorded Announcement Trunk, etc.).

WIRE CENTER - (See CENTRAL OFFICE).

NOTE: All correspondence to the ICC regarding 911 should be addressed as follows:

Illinois Commerce Commission
527 East Capitol Avenue
Springfield, Illinois 62706

Attention: 911 Staff

ACKNOWLEDGEMENTS

The State of Illinois has laid the groundwork for one of the most significant citizen-oriented emergency/communication services available--the statewide provision of the single emergency telephone number, 911. During the ten months of this study, the SRI project team of Thomas Dayharsh, Susan Ivy, Terrence Yung, and Gary Barker have received exceptional support from large numbers of Illinois local and state officials and from the state's telephone industry.

We wish to extend our special thanks to John Kissel and Tim Fox of the ICC for their excellent guidance and assistance. Special thanks are also due to David Goldberg of the ILEC for his considerable contribution of information and suggestions on the operations of law enforcement agencies in the state.

Two committees, the 911 Policy Committee and the 911 Telephone Industry Committee, have assisted the ICC and SRI during the course of this study. These committees have provided invaluable suggestions for the study effort and constructive criticism of the study outputs. This has been an especially formidable task for the committees because of the highly interactive and iterative study process adopted by the ICC and SRI. We believe that these committee members--whose names are listed at the end of this acknowledgement section--contributed to the success of this study to a degree well beyond that normally contributed by such committees.

Many hundreds of local Illinois officials and other individuals (too numerous to thank individually) provided us with information that was of great value to this study. We wish to thank them collectively for their contribution to the study effort.

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Association	Personnel
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Illinois Commerce Commission	John Kissel, Tim Fox, William Dunkel
Illinois Fire Chiefs Association	Richard Beilfuss
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Illinois Department of Public Health	Daniel Von Berg
Illinois Department of Transportation	Marvin Hardin
Illinois Law Enforcement Commission	David Goldberg
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911 POLICY COMMITTEE cont.

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<u>Affiliation</u>	<u>Member</u>
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I INTRODUCTION

A. General

Illinois has more than 600 police, 1200 fire, and 600 ambulance/rescue agencies. Each of these agencies has one (or more) telephone numbers which must be used by the state's citizens for contacting these agencies in an emergency. The replacement of over 2000 telephone numbers by the single number Nine-One-One (911) will result in crucial savings of anxiety and time for Illinois citizens in obtaining emergency assistance from their public safety agencies. Savings in time can result in: financial savings through reductions in property losses; reduction in the effects of injuries; increased apprehension of criminals; and, in some cases, the savings of life itself.

Recognizing the immense public benefit of 911, the Illinois Legislature developed House Bill No. 911* which contains directions, mechanisms, and a timetable for the development of 911 systems on a statewide basis in Illinois. This Bill designates the Illinois Commerce Commission (ICC) as the principal state agency for the development and implementation of local 911 systems in Illinois.

This manual describes a systematic process by which local governments, public safety agencies, and telephone companies can interact with each other and with the ICC in developing systems that are tailored to local situations while simultaneously meeting the requirements of House Bill No. 911. This manual is one of three volumes^{1,2,3} that provide, respectively, a basis for state, local, and telephone company 911 planning in Illinois (references are provided on page 75 of this manual).

B. Benefits of 911 in Illinois

The major benefits of 911 to citizens and public safety agencies should be understood by those involved in the planning and implementation of 911 systems in the state. The means by which 911 provides this benefit is primarily by saving time in the overall response of a public safety agency.

The total time required in response to a perceived emergency is the sum of:

- (1) Time from citizen perception of an emergency situation to the time he or she reaches the correct public safety agency,

*House Bill 911 became PA 79-1092. A copy of the Bill is included as Appendix A of this Manual.

(2) time from reception of a call by the agency to the time an emergency service vehicle is dispatched to the scene of the emergency, and

(3) time from the dispatch of the vehicle to the time it arrives at the scene of the emergency.

A 911 system can provide important time savings in the first of these three components of the total response time.

A number of surveys^{4,5,6} have been conducted on the problems citizens have in reaching their public safety agencies. These surveys showed that less than 50 percent of the citizens knew the telephone numbers of their own public safety agencies, and at least 20 percent did not know their correct agencies. Clearly, when citizens are traveling, only a very few would know appropriate agencies, much less the emergency telephone numbers of these agencies. Citizens who did not know the correct emergency telephone number relied (according to the surveys) on telephone books or direct calls--dial zero (0)--to telephone company operators.

Telephone operators have historically provided the citizen who does not know the correct number with assistance through dial "0" service. However, these operators are not highly trained in emergency service requirements and must themselves search the telephone directories for the telephone number of the correct agency. An additional complication with the use of the telephone operator for emergencies is the gradual reduction of the number of operator centers that has been caused by automation of telephone switching centers. An operator reached through dialing "0" in an emergency could well be over 200 miles from the scene of the emergency and would, therefore, be ill-equipped to assist the citizen in selecting the correct agency.

Average call delays for citizens not knowing the correct number ranged from 1 to 3.5 minutes, depending upon agency type and the number of agencies contacted before the correct agency was reached. Fully 20 percent of the citizens surveyed had an average delay of 3.5 minutes because of failure to reach the correct agency on the first contact. Additionally, 10 percent of these citizens needed assistance from more than one type of agency.

These large delays (often comparable to the traditionally measured response time of agencies) in citizen access to public safety agencies are caused by citizen confusion about agency identification and the lack of easily located emergency numbers.

By utilizing 911 as a universal emergency number, both of these problem areas will be eliminated. The three-digit number is easily remembered, and trained answering personnel can quickly identify the correct agency and provide for the transfer of the emergency information to that agency.

The benefits of reduced response time by emergency services agencies are quite clear. A study by the President's Commission on Law Enforcement showed a direct relationship between apprehension of criminals and low response time. A reduction of an average of only one minute in fire response time could probably pay for the yearly cost of 911 in Illinois, as indicated by an earlier SRI study for the State of Florida. Finally, a reduction in response time for ambulance and rescue units will reduce the death rate in heart attack, injury accident, and other life or death emergency medical responses. An important, but somewhat less clearly seen, benefit of 911 is the more efficient (and, therefore, more cost-effective) use of scarce emergency service resources for the public benefit.

C. Time Table for Illinois 911 System Development

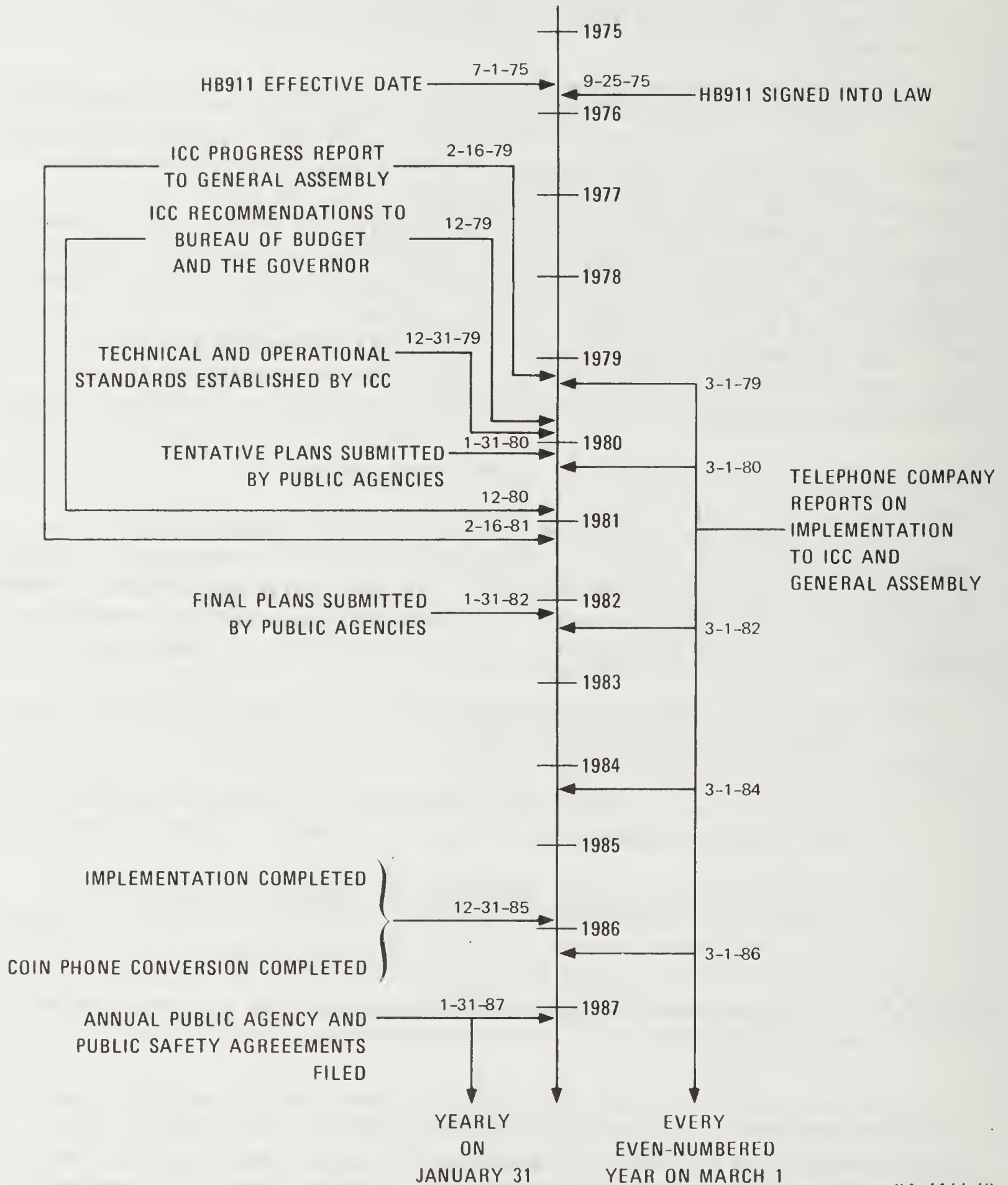
Table 1 shows the time frame enacted in HB 911 (See Appendix A for a copy of the Bill). Although it was signed into law in September of 1975, it is retroactive to July 1 of that year. The ICC is the state agency responsible for actualizing legislative intent, and coordinating statewide 911 development. Key dates of interest to local officials are listed below.

- The ICC must submit to the legislature technical and operational standards by December 31, 1979.
- Local governments must submit tentative 911 plans to the ICC and the telephone companies by January 31, 1980.
- Final 911 plans must be submitted by January 1, 1982.
- 911 systems must be operational throughout the entire state by December 31, 1985.

Although the ICC is not required to present formal technical/operational standards to the legislature until 1979, it is imperative that these standards be defined at a much earlier date. Both the ICC and concerned local agencies must know these standards before 911 systems can be logically planned. Since it is anticipated that many local jurisdictions will implement 911 prior to the legislative deadline, clear standards are important for their planning efforts.

Table 1

ILLINOIS HOUSE BILL 911 TIME TABLE



Towards this goal, a set of proposed standards is presented in Section V-E. These standards were developed with assistance from the ICC and the 911 Policy Committee. Although they have not been formally approved, they do provide a framework for local 911 planning and development.

II OVERVIEW OF 911 PLANNING PROCESS

A. General

The 911 planning process should begin with the local 911 Committee analyzing the local public safety and telephone situations and end with the installation of a 911 system (or systems) developed by that Committee. During the development process, the following planning steps--illustrated in Figure 1--should be accomplished:

- (1) Formation of the local 911 Committee (see Section III)
- (2) Analysis of Local Jurisdictional, Public Safety, and Telephone Situations
- (3) Evaluation of 911 Call Handling Techniques and Standards
- (4) Analysis of Alternative 911 Configurations and PSAPs
- (5) Analysis of Management Forms
- (6) Selection of Alternatives
- (7) Preparation of Preliminary 911 Plans
- (8) Continued 911 Activities, Including Preparation of Final 911 Plans, Until 911 System is Implemented.

Planning steps 2, 3, 4, and 5 should be performed by the planning unit originally formed by the process described in Section III. These steps provide consideration by the 911 Committee of all factors affecting system selection. By performing them as a planning unit, all participants will be able to make fully-informed decisions when selecting among the 911 alternatives.

Planning units in counties should combine their 911 system plans into single county plans for submission to the ICC.* Planning step 6 involves the selection of alternative 911 systems based on the first three steps. If the planning unit determines that two or more 911 systems are desirable for the area, then steps 7 and 8 can be performed by separate planning units.

The remainder of this Section contains a brief overview of these recommended planning steps with subsequent sections containing more detail on each step. We recommend that each planning step be the subject of one or more meetings of the 911 Committee with sufficient time allowed between meetings for the collection of information and interactions between system participants. As shown in Figure 1, the ICC will provide help at any time it is requested by the planning units.

*Heavily populated counties such as Cook, Du Page, Lake, Madison, and Kane may not find it feasible to provide single county plans. They should, however, make sure that all citizens, jurisdictions, and agencies of the county are included in any group of subcounty plans.

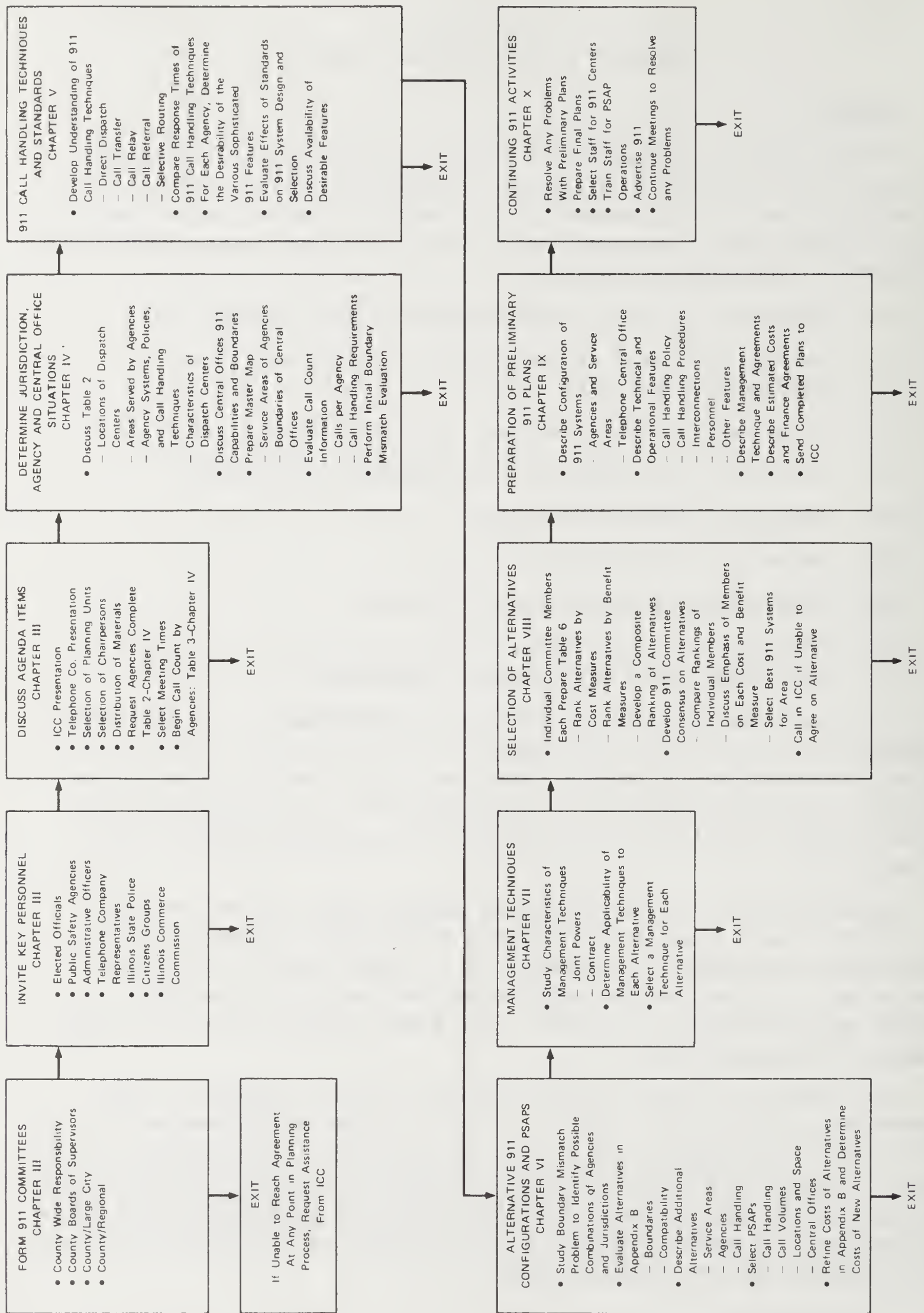


FIGURE 1 OVERVIEW OF THE 911 PLANNING PROCESS

B. Analysis of Local Jurisdictional, Public Safety, and Telephone Situations

Each 911 planning unit (see Section III for process of constituting planning units) will encompass a fairly large number of jurisdictions, public safety agencies, and telephone company central offices. The 911 Committee will want to determine the following current and future factors about these entities:

- The geographic area served by each agency
- The locations of all answering and dispatch points
- Agency operations and levels of service
- Current working arrangements among the agencies and jurisdictions
- The jurisdictions, agencies, and service areas included in each central office boundary
- Types of central office equipment
- Planned changes in telephone, agency, or jurisdictional situations.

This basic information on the operations of the participants in the 911 planning unit can then be evaluated to determine:

- Extent of boundary mismatch between agency, jurisdiction, and telephone exchange boundaries
- Types of call answering and dispatch procedures employed by agencies
- Initial consideration of agency groupings for 911 call answering based on the factors listed above.

The planning units should prepare a master map of the boundaries in their areas.* This analysis will provide the 911 Committee members with a common picture of the local situation as it effects 911 implementation.

*We recommend the use of standard County Maps available from the Illinois Department of Transportation.

C. Evaluation of Call Handling Techniques and Standards

There are only four basic call handling techniques that can be used by a 911 center: 1) direct dispatch (collocated 911 answering and dispatch), 2) call transfer, 3) call relay, and 4) call referral. Selective routing is an alternative method of routing calls to specific PSAPs. These techniques should be evaluated by the 911 Committee to determine their applicability to each agency, jurisdiction, and telephone central office. Section V contains descriptions of these call handling techniques.

The technical and operational standards were developed to assure that all 911 systems provide required levels of service to all Illinois citizens. These standards should be reviewed in detail by the 911 Committee in order that their impacts on system selection and system design are clear.

D. Analysis of Alternative 911 Configurations and Public Safety Answering Points (PSAPs)

A number of alternative 911 configurations are presented in Appendix B. These configurations should be evaluated by the 911 Committees in order to determine which ones best match the needs of their areas. Additional configurations may also have evolved from the first two planning steps and these should be described and costed.

Explicit factors to be considered in this planning step are:

- Effect of boundary mismatch on call handling for each agency and on inter-911-system call handling
- Geographic areas, jurisdictions, and agencies to be included in each 911 system
- Selection of candidate PSAP (normally the agency with the highest call volume) for each 911 system
- Call handling method for each agency in each 911 system
- Costs of alternative 911 systems.

E. Management Techniques

Most 911 systems will be operated under either joint powers or contract agreements. These agreements will provide a basis for control of the policies, operations, finances, and obligations of the participants in each 911 system.

F. Selection of Alternatives

The selection of alternatives by the 911 Committees should be made using the cost and benefit information developed in the earlier planning steps. Each alternative will have three basic features, 1) a specific geographic area that includes a number of jurisdictions, agencies, and telephone exchanges, 2) a set of preferred call handling procedures for the included agencies, and 3) a preferred method of managing the 911 system. Each alternative will have certain costs for personnel, equipment, and, in some cases, space.

The 911 Committees should compare the costs and benefits of each alternative and select that alternative that best matches their local needs. The selection of an alternative may mean that more than one 911 system will be developed in the original planning area. In that case, the 911 Committee may want to split along the boundaries of the selected 911 systems for the final two planning steps.

G. Preparation of Preliminary 911 Plans

Preliminary 911 Plans must be submitted to the ICC by January 31, 1980. These plans should contain an implementation schedule and the following information:

- The jurisdictions, agencies, and telephone exchanges included in each 911 system
- The call handling techniques to be used for each agency
- The technical and operational characteristics of the system
- The levels of service provided by the system
- The method of managing the 911 system plus draft agreements (joint powers or contract) between jurisdictions and agencies in each 911 system and between adjacent 911 systems' participants
- The estimated cost of the 911 systems.

H. Continued 911 Activities

Upon approval of the preliminary 911 plans by the ICC and concurrence by the telephone companies, the 911 Committee can finalize their 911 plans and order 911 system components from the telephone companies and other suppliers. Final plans should be made for the transfer of existing personnel to 911 duties, if desired, and final versions of the management agreements should be drafted.

Training of personnel for the 911 centers should be begun, 911 center managers should be selected and trained, and advertising of 911 begun to inform the public of actual cutover dates from old 7-digit numbers to 911.

III THE FIRST 911 MEETING

Initiating the 911 planning process in Illinois is complicated by the fact that Illinois has regions which are heavily urbanized, regions which are extremely rural, and many types of urban-rural mixes in between. It is impossible to make one standard recommendation about who should be responsible for initiating 911 planning. Consequently, we offer general guidelines to initiate 911 planning.

It should be noted that the agency initiating the planning process for a particular area does not restrict that area from either dividing into smaller planning areas or combining with all or part of adjoining planning areas. For example, if a city, county, or regional agency initiates the planning process, it does not mean that city, county, or regional 911 systems must develop from that meeting.

This section discusses the calling of the first meeting, provides a list of personnel that should be invited, and describes some of the agenda items for the first meeting.

A. Responsible Units of Local Government

Potential 911 planning units in local government include cities, counties, planning commissions, and groups of government units with joint planning efforts in the area of public safety operations.

In the more heavily urbanized counties (250,000 or more citizens), the focus of initial planning should be cities, groups of cities and/or counties, and counties. Except in the larger counties, countywide plans should be developed for each county, regardless of how many 911 systems are implemented within its boundaries. Therefore, county administrations (either Boards of Supervisors and/or County Administrators) are requested to see that 911 planning is initiated in all areas (incorporated and unincorporated) of their counties. If planning is not initiated in some part of a county, that county should notify the ICC.

In heavily populated areas where a single city contains a significant part of a county's population--as Rockford in Winnebago County--a joint city-county planning effort may be indicated for an initial planning step. In urban counties with a large number of jurisdictions--as suburban Cook County, Du Page County, St. Clair County, Madison County, Lake County, Rock Island County, etc.--individual cities or groups of cities with common public safety communications objectives should initiate planning.

It is important that each such planning unit include all police, fire, and emergency medical resources within its boundaries and that it coordinate with other planning units in its county.

In less heavily populated regions, it is recommended that available regional planning units initiate 911 planning. These units have the advantage of planning experience and personnel and ongoing contacts with local jurisdictions and agencies.

Again, remember that the purpose of the first meetings is to initiate planning and disperse information. They are not intended to be the focal point of all future 911 planning steps unless all jurisdictions decide, during this first meeting, to maintain the initial meeting group as the planning unit for their area.

B. Calling the First 911 Meeting

Planning should then begin with the calling of a first committee meeting. The agency responsible for calling the first 911 Committee meeting should then obtain a complete list of personnel who should be invited to the meeting. Assistance in developing this list can be obtained through local public safety and administrative personnel (and ICC personnel, if required).

The following list indicates persons (or their authorized representatives) who should be invited to the first meeting:

- County Administrative Officer or Chairman of Board of Supervisors
- City administrative Officers (elected or appointed)
- Authorized representatives of regional planning units
- Sheriff, Chiefs of Police, and an authorized representative of the Illinois State Police
- Fire Chiefs (municipal, district, and volunteer departments)
- Emergency Medical Administrators and Planners--both hospital and ambulance
- State, Local, or Federal Forestry, if appropriate
- Emergency Services Representatives, if appropriate

- Telephone company representatives
- ICC representatives.

In addition, it would be desirable to include the following persons:

- Chief elected officials of local governments
- Nonprofit service corporation agencies (mental health clinics, suicide prevention, etc.)
- Federal Public Safety agencies in the county
- Citizens' Groups Representatives
- Others as needed.

The first group is basic to 911 planning, while the second group can provide important input.

Although it is anticipated that the 911 Committees will use fewer members as the planning process continues, it is important that all interested parties have an opportunity to attend at least the first meeting. It is recommended that a night or weekend meeting be scheduled.

C. Agenda Items for the First 911 Meeting

The following agenda items should be included at the first meeting:

- A presentation by the ICC representative covering House Bill No. 911, the planning process, and support available from the ICC
- The selection of personnel who will participate in the ongoing planning process, including at least one from each of the mandatory categories listed above
- Selection of future 911 planning units for the area
- Selection of a chairman for the 911 committee
- Distribution of planning manuals
- Selection of meeting times and agenda items

- Request that agencies complete Table 2-Section IV
- Request that agencies begin event counts using Table 3-Section IV.

To cover these items adequately, the initial meeting should be scheduled for at least two hours.

The process of starting 911 planning will be aided in any required way by the ICC. Any problems or confusion on how to initiate 911 planning should be referred to the ICC.

IV LOCAL JURISDICTION, AGENCY, AND CENTRAL OFFICE SITUATIONS

This first planning step is perhaps the most important of all the planning steps. Whether covered in one or several meetings, it will provide the basic groundwork upon which all subsequent planning steps are based. The objective of this planning step is to obtain sufficient information about the jurisdictions, agencies, and telephone company central offices to provide a basis for evaluating alternative 911 systems. Four areas will be covered in this section:

- Determination of dispatch center locations and service areas
- Descriptions of call handling techniques, communication systems, and communication policies
- Descriptions of telephone company interactions
- Initial evaluation of boundary mismatch.

A. Dispatch Centers and Service Areas

In each 911 planning area there will be a number of police, fire, and emergency medical facilities that must be included in the area's 911 systems. In addition, other agencies in the area may be included in the 911 systems at the discretion of the local 911 committee. It is recommended that each agency prepare maps of their service areas and complete Table 2 before the first meeting (of this planning step) occurs.

The first step in determining agency and central office situations in the 911 planning area will be for each agency to provide a map and/or written description of its service areas and answering locations. Each agency should prepare this information and complete Table 2 (described in the next part of this section) prior to the planning session. The principal effort at this session will be to transfer service area and answering point information to a master map. It is necessary that each 911 Committee adopt a master map depicting their 911 planning area and submit a copy to the ICC.

Most city police, sheriffs, city fire, fire protection districts, and municipal ambulance/rescue services will have well-defined service areas. Private ambulance companies and the emergency rooms of hospitals will

Table 2 CALL HANDLING, SYSTEMS, PROCEDURES, AND POLICIES

1. Name of Agency _____

2. Location of Agency (address) _____

3.

Names and Locations of Served Agencies						
Name of Agency	Location of Agency				Hours of Provided Service	
	Number	Street	City	County	From	To

4. Location of Phone Answering (address) _____

5. Emergency Phone Number(s) _____

6. Administrative Phone Number(s) _____

7. Type of Telephone Answering Equipment _____

8. Number and Type of Incoming Lines _____

9. Manned Answering Positions per Shift: Day _____
 Afternoon _____
 Midnight _____

Table 2 CALL HANDLING, SYSTEMS, PROCEDURES, AND POLICIES

(continued)

10. Tie Lines to Other Agencies

No. of Lines	Connected Agency	Address of Agency			
		Number	Street	City	County

11. Is Communication System a Radio Alert Type? _____ If yes, describe below _____

12. Is Communication System an Alarm Type? _____ If yes, describe below _____

13. Number of Communications Stages? One _____ Two _____ Three _____

14. Type of Call Recording Equipment _____

15. Emergency Power System and additional capacity (if any) _____

16. List Types of and Codes of Calls and/or Events Handled as High Priority or Emergency _____

Table 2 CALL HANDLING, SYSTEMS, PROCEDURES, AND POLICIES

(concluded)

17. Do these calls correspond to those you want handled by 911?

Yes _____ No _____

18. If no, describe additions or deletions to/from the list

probably not have such well-defined service areas and should, therefore, provide their primary or principal service areas to the 911 committees.* The service areas of the local ISP district need to be included on the master map. Finally, the service areas of all other public safety facilities that may be included in the 911 plans--such as tow services, highway maintenance, poison control, suicide prevention, state forestry, federal parks and forests, major industrial or commercial enterprises, etc.--should be obtained and added to the master map.

Depending on the complexity of the master map, its preparation can occur at the first meeting or be delegated to one or more of the 911 Committee members for preparation between meetings.

B. Call Handling, Systems, and Policies of Agencies

Each agency in the 911 planning areas should provide the 911 Committee with sufficient information about its operations so that realistic 911 alternatives can be developed. It is recommended that each agency use Table 2 to provide telephone information to their 911 Committee. In addition, certain dispatch information should also be provided. In the remainder of this section, we will discuss the type of information requested in the table.

1. Telephone Information

The "name of the agency" is that of the agency providing the communication service. It is not restricted to public safety agencies and can include multi-agency and/or multi-jurisdictional communication centers, joint switchboards, or other entities providing communications service for public safety and private agencies that provide emergency services to the public.

In many cases, agencies provide communication services for other agencies. Item 3 in Table 2 requests the names, addresses, and hours of service of these agencies.

Item 4 requests the address of the phone answering locations. Only if this address differs from item 2 is it necessary to answer this question. Items 5 and 6 request telephone numbers from all agencies completing the form.

* Medical Emergency Communications of Illinois (MERCI) net base stations should be tied to appropriate PSAPs.

Item 7 can be answered with the assistance of the telephone company representative (if necessary). What is needed is a description of the type of answering and call handling equipment--such as a key set with the number of buttons and model number, a cord board with similar data, or other answering system--that is used in each communication center. Items 8, 9, and 10 are self explanatory.

Items 11 and 12 request descriptions of systems in which the telephone call initiates an action other than direct answering of the call by the agency. Radio alert systems key pocket receivers carried by volunteers. A 911 center will have to be able to dial the number to key these receivers upon receipt of an emergency call. Similarly, if the current system rings a bell or activates an alarm upon dialing an emergency number, the 911 center will also have to be able to dial that number.

Item 13 requests information on whether the system is one stage (call answering and dispatching are performed by the same person) or two stages (call answering and dispatching are performed by two people). Item 14 requests information on the type of equipment used to record incoming calls. Although information on an analog magnetic tape system is desired, even if calls are logged by hand that information should be provided in item 14. Item 15 seeks to determine if there is emergency power available in the communication center, should commercial power fail. Items 16, 17, and 18 are used to provide an initial basis for determining the types of calls or events to be handled by the 911 centers.

2. Dispatch Information

Besides the telephone system data requested in Table 2, the agencies will want to discuss the dispatch capabilities of their centers. Of particular interest in the later selection of PSAPs will be information on Computer Aided Dispatch (CAD) capabilities and on special or unique radio systems.

In addition to providing computer assistance for dispatch operations (status keeping, logging, access to information systems, etc.), a computer can provide assistance to PSAP operators. For example, the computer can maintain files of event times that have been digitally entered by operators; it can cross reference telephone numbers and public safety agencies to identify the correct agency for contact; it can provide status data on vehicular resources; and so on.

In any particular 911 planning area, the dispatch centers may have different capabilities to interface with the public and with other agencies. For example, some dispatch centers could be connected into the MERCI system, some could have common frequencies with other agencies, some could have CB equipment on emergency channels, some could be connected to highway emergency call boxes, and some could be cross banded on S.P. frequency, 39.5 MHz.

These and other dispatch situations should be discussed in 911 Committee meetings in order that complete information is available for the eventual selection of PSAPs and the configuration of 911 systems.

C. Telephone Company Interactions

The local telephone companies will play an important part in the 911 planning process. They will provide valuable information on their own situations in the 911 planning areas and will provide information on the telephone system aspects of 911 systems. Guidance for telephone company planning is provided in a companion manual to this one. That guidance should be discussed by the local telephone company representative at the first 911 meeting. In this first planning step, the local telephone company representatives should provide:

- Information on a call count for each agency
- Descriptions of their central offices and boundary maps.

A valuable step in the planning and sizing of alternative 911 systems will be a determination of the number of calls handled by each agency in a 911 planning area. Incoming calls for a period of at least three months should be used to determine the call volumes for each agency. Table 3 can be used by the agencies for this purpose. Another valuable input to the 911 Committee would be a description of recent periods (not included in the call counting period) that contained unusually high numbers of incoming calls. Call handling experience in these periods can help in sizing the 911 systems.

The telephone central offices in the 911 planning regions can provide some limits on the types of 911 operating techniques that can be used. The local telephone company representatives should provide the 911 Committees with a briefing on their current central office equipment and their possible restraints on 911 techniques. Additionally, plans for changing central office equipment--particularly in areas where current equipment restricts 911 alternatives--should be conveyed to the 911 Committee.

Table 3 CALL VOLUMES OF AGENCIES

DATE _____

TYPE OF INCOMING CALL

BUSINESS	EMERGENCY	MISDIRECTED	NUISANCE	MISCELLANEOUS

DATE _____

TYPE OF INCOMING CALL

BUSINESS	EMERGENCY	MISDIRECTED	NUISANCE	MISCELLANEOUS

DATE _____

TYPE OF INCOMING CALL

BUSINESS	EMERGENCY	MISDIRECTED	NUISANCE	MISCELLANEOUS

D. Boundary Mismatch

The local telephone companies should next add the boundaries of their exchange areas to the master map. This step will provide the 911 Committee with a clear visualization of the extent to which the agency service areas match telephone central office areas. In general, it will be found that there is little matching of these boundaries and that agency service areas are:

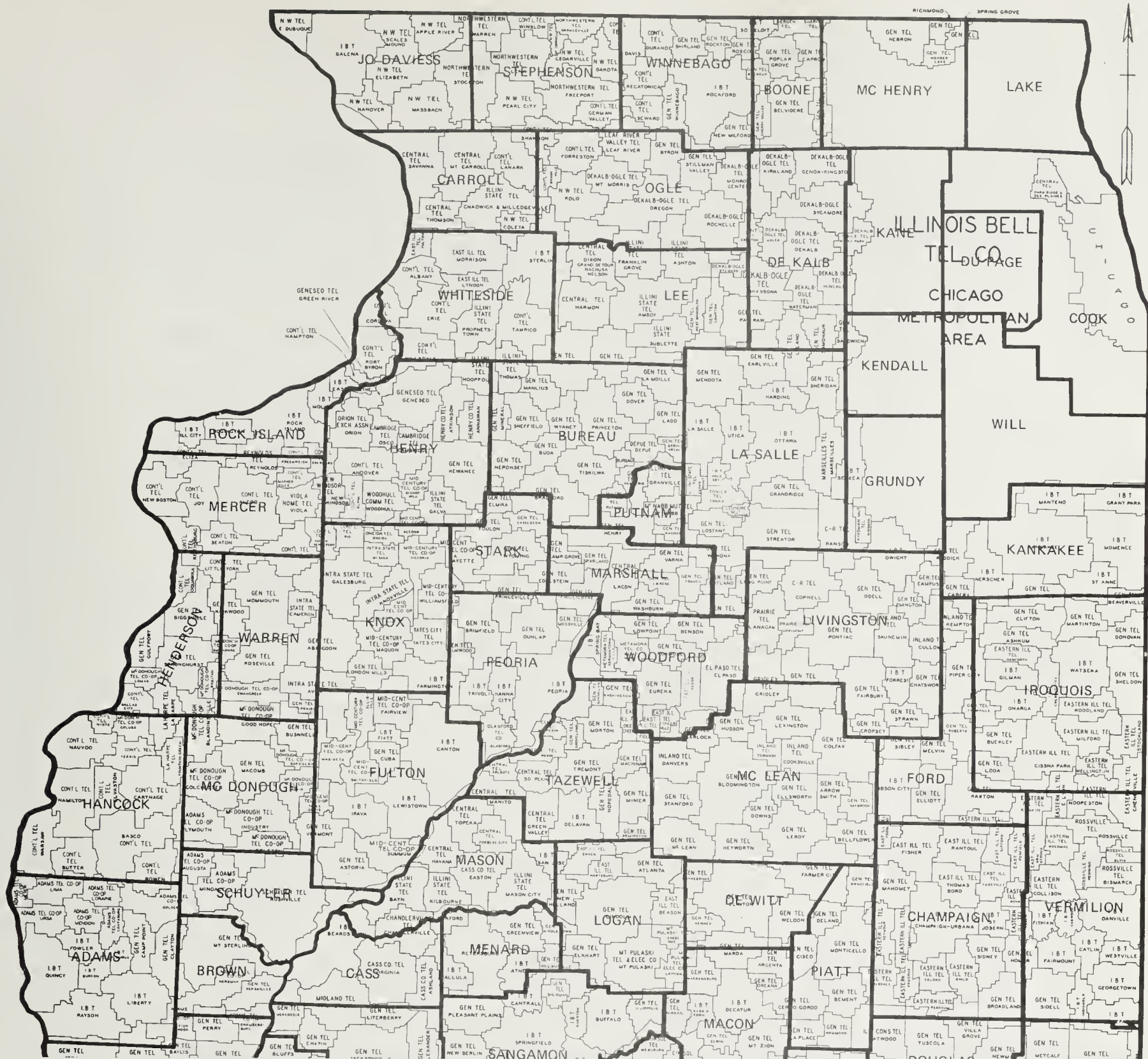
- Included in several central office areas, and/or
- Shared with other agencies and/or jurisdictions in central office areas.

Figure 2 provides a general overview of the extent of this mismatch. Note, for example, that there is little coincidence between county boundaries and telephone central office boundaries. Also note that a central office located in a city has boundaries that include a considerable amount of the service areas of both the sheriff and surrounding cities. Not all overlaps are significant since in some cases there is minimum population involved in an overlap area.

At this point in the planning process, it is advisable for each jurisdiction and agency to study the master map for the purposes of:

- Determining the extent to which its service areas coincide with telephone central office boundaries
- Noting those agencies and jurisdictions with which it is linked by the telephone central office boundaries
- Determining the number of people in each agency service area that are affected by a mismatch
- Making preliminary estimates of possible 911 systems in its 911 planning region.

N



N

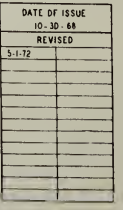


FIGURE 2 TELEPHONE AND COUNTY BOUNDARIES

V 911 CALL HANDLING TECHNIQUES AND STANDARDS

This second planning step should be undertaken after the 911 Committees develop descriptions of the local jurisdiction, agency, and telephone company situations (Planning step No. 1). In this step, the 911 Committees should evaluate the 911 call handling techniques and the preliminary technical and operational standards.

This section covers:

- The four basic 911 call handling techniques
- "Sophisticated" 911 system options
- Selective call routing.

These are discussed in terms of their operational rather than technical characteristics. Technical characteristics and technical requirements for these 911 call handling techniques are provided in the 911 telephone planning manual; these technical characteristics can be further explained either by the telephone company representatives or by ICC personnel.

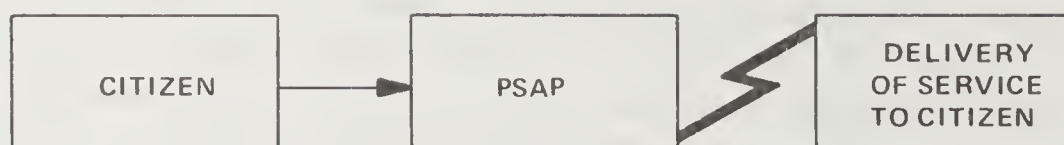
The technical and operational standards provided in this section are preliminary, but reflect a consensus of the opinions of the State 911 Planning Committee, the ICC, and Stanford Research Institute (SRI). These preliminary standards provide the local 911 Committee with guidance for the design of effective 911 systems.

It should be noted that, because of these standards, the levels of service provided by the PSAPs may exceed those of some of the dispatch centers. As a part of the process of evaluating 911 alternatives, the 911 Committees may want to consider means of upgrading the performance of such dispatch centers. Such upgrading would insure that the high levels of service of the PSAPs are not diluted by lower levels of service in the dispatch centers.

A. 911 Call Handling Techniques

There are four basic 911 operational methods defined in HB 911: direct dispatch, call transfer, call relay, and call referral. These methods are described below. It should be noted that public safety answering points (PSAPs) can use any combination of these call handling techniques. In Section VI, the process of determining PSAP operations is described.

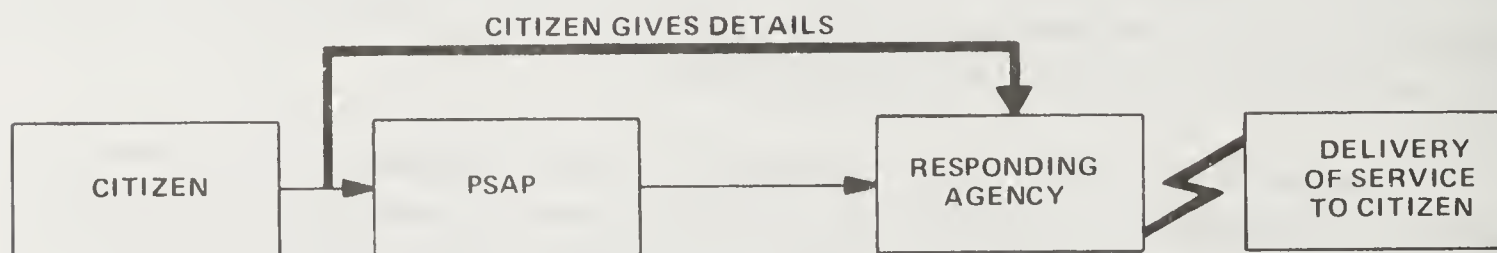
1. Direct Dispatch



DIRECT DISPATCH

In the direct dispatch method, two of the emergency communication system functions--911 call answering and radio dispatching--are collocated. For example, the PSAP could be collocated with a centralized multi-agency radio dispatch center that handles emergency calls for police, fire, and emergency medical services. Alternatively, it could be collocated with a single agency (most commonly a police department) that provides one type of emergency service. In the direct dispatch method, call answering and radio dispatching may be performed by separate individuals (two stage) or the same individual (single stage). Transmission of information from the PSAP to agencies that are not directly dispatched can be accomplished using one or a combination of the remaining three basic operational methods: call transfer, call relay, or call referral.

2. Call Transfer

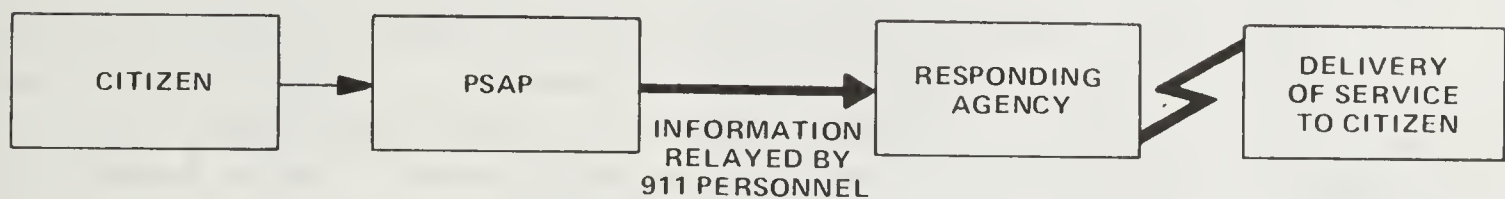


CALL TRANSFER

Call transfer requires that the citizen first dial 911 to reach the PSAP. The PSAP then obtains, as rapidly as possible, the location and nature of the problem and determines which public safety agency should respond to the incident. Then, by direct tie line, the PSAP connects the citizen to the proper agency. The PSAP functions as a switchboard, and the citizen gives the complete explanation of his problem to the proper agency.

The major advantage of call transfer is the lack of interagency coordination necessary after implementation. Its most common application is in situations involving core-city fire protection agencies and for public safety agencies in outlying cities. That is, situations where the particular emergency service agency wants to perform its own screening of calls and preserve its organizational identity in the eyes of the public. It has two major disadvantages. First, the response time is longer than that of the direct dispatch method. Second, the citizen must repeat parts of the incident details, a problem that is often frustrating to a citizen under stress.

3. Call Relay

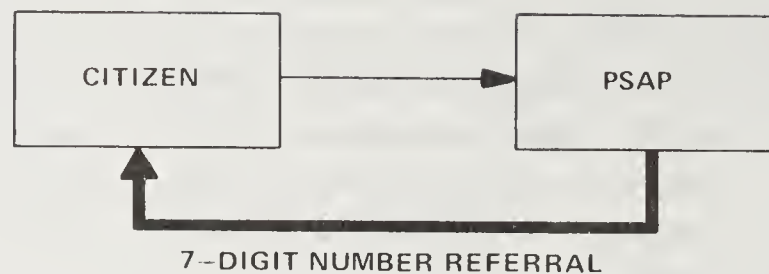


CALL RELAY

Similar facilities are required for call relay and call transfer. In call relay, however, the information rather than the caller is transferred to the proper agency. The information is obtained from the citizen by the PSAP and relayed to the proper dispatch center by voice or digital communication. The citizen does not perceive any difference between call relay and direct dispatch because the PSAP relays the information to the proper agency, and the citizen is spared the necessity of repeating incident details.

The major advantage of call relay is that the response time is essentially the same as that of two stage direct dispatch, and citizen frustration is minimized. Call relay also has the advantage of leaving dispatch operations under the control of individual agencies, who view the dispatch function as a management and control function rather than a more neutral "resource allocation" function. A disadvantage of call relay is that proper operation requires explicit call-answering policies for the various agencies. This necessitates a degree of cooperation which many agencies find difficult to achieve.

4. Call Referral



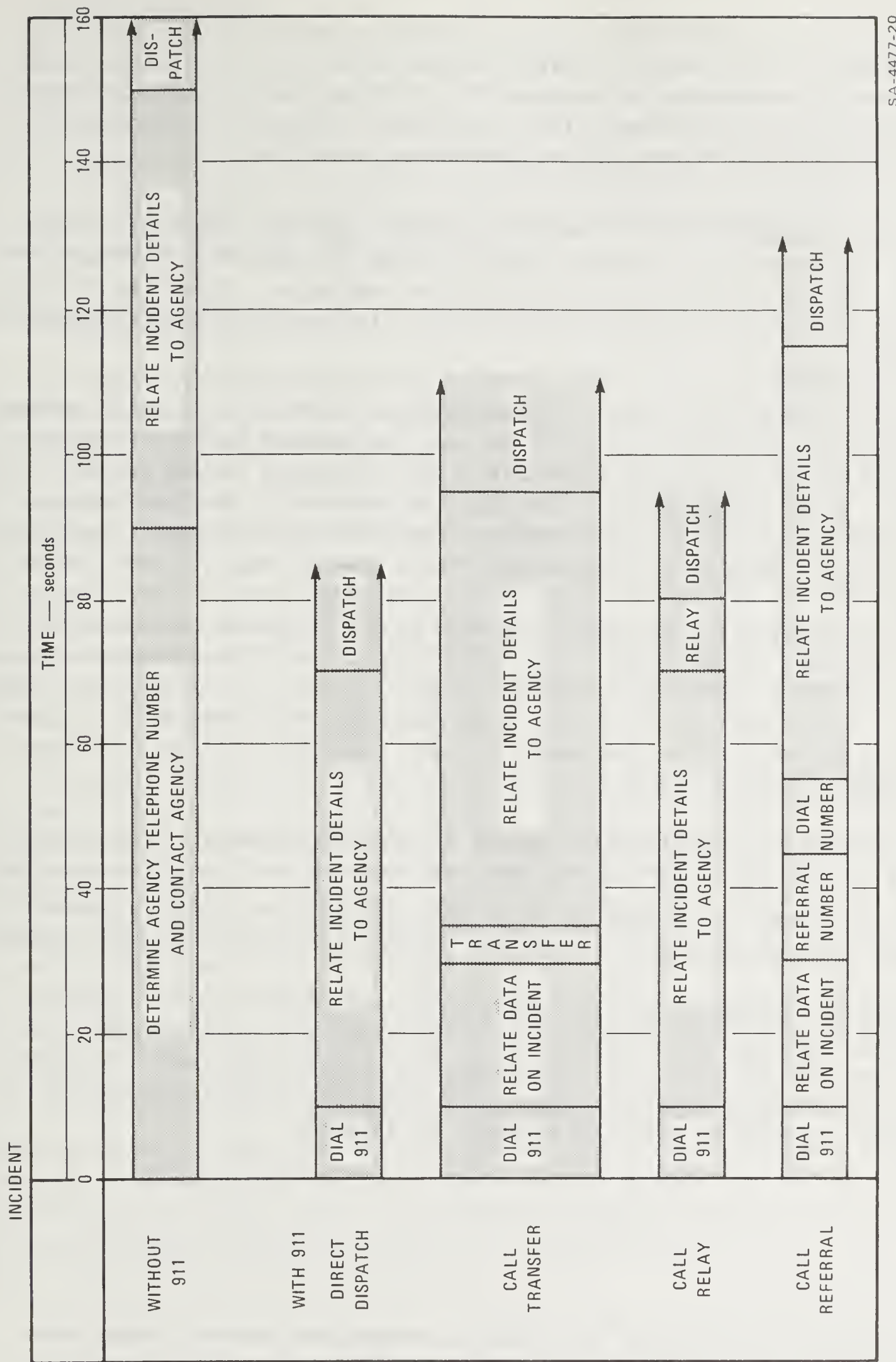
CALL REFERRAL

The call referral method, in which the PSAP provides the citizen a 7-digit number to dial, is used for two purposes. First, certain agencies may not have the volume of urgent calls to warrant the potentially expensive equipment necessary for call transfer or call relay. Common examples of such agencies are the Coast Guard, Poison Control, the FBI, public works departments, and utility companies. Second, citizens should be discouraged from using 911 for non-emergency calls so as to keep the lines free for emergency calls. Therefore, call referral is also a means of informing the public, in a polite and professional manner, that they should not use 911 except in the case of an emergency.

B. Comparison of Times Used by 911 Call Handling Methods

In Section I of this manual, the general benefits of 911 were discussed. In the previous subsection, the general applications of these 911 call handling techniques were described. In this subsection, the amount of time required for each of these 911 call handling methods is discussed.

Figure 3 illustrates the time requirements for the various 911 call handling techniques. Previous research has established that certain steps in the communication process take a standard amount of time. For example, it takes about five seconds to dial 911. It takes about 60 seconds for the citizen to relate incident details, and it takes about 10 seconds for car dispatch. These standard times appear in Figure 3 in conjunction with variable event times--that is, those times which are unique to each call handling method. Included at the top of Figure 3 is the average amount of time delay incurred by callers without 911. This average delay without 911 is the delay resulting from a need for approximately 50% of resident citizens to look up the number of the correct agency, to go through the telephone operator, or, for more than 20% of the



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FIGURE 3 COMPARISON OF AVERAGE TIMES FOR CONVENTIONAL AND 911 OPERATIONS

citizens, to be transferred from one agency to another. The amount of time from citizen recognition of an incident--the left end of the time bars--to the completion of a dispatch--the right end of the time bars--is composed of the standard times plus times required for operations that are specific to each 911 call handling technique.

Direct dispatch is the fastest 911 call handling technique. Approximately 80 seconds are required from the time the incident is recognized by the citizen to the time the dispatch is completed. This time is only one-half of the time required--160 seconds--for many citizens with non-911 systems.

Call transfer 911 adds two operations to the direct dispatch method; (1) obtaining incident data and selecting the correct agency to receive the transferred call, and (2) transferring the caller to the correct agency. These two operations add about 25 seconds to the time required to direct dispatch 911. Call transfer has a resultant overall time of 105 seconds. This is still nearly a minute faster than non-911 systems.

Call relay 911 takes more time than direct dispatch 911 and less time than call transfer 911. With call relay, the 911 call answerer transfers the information rather than the caller. Thus, the citizen does not have to repeat part^{*} of his story as he does with call transfer. A time of about 90 seconds^{*} is thus spent on call relay which is over a minute less than non-911 systems.

Even call referral 911 is faster than non-911 systems by more than half a minute. In call referral 911, the PSAP is only involved with the caller for about 45 seconds which is only one-half the time it takes over 50% of the callers to obtain the correct agency with non-911 systems.

The 911 Committee members should evaluate these various times for 911 call handling techniques to determine their impact on selection of a call handling technique for their agencies and jurisdictions. Telephone company representatives can discuss the telephone system requirements for these techniques with the members, as desired.

* Although a relay time of ten seconds is shown in Figure 3, this time is variable and depends on the amount of information to be relayed.

C. Sophisticated 911

Sophisticated 911, as defined by HB 911, involves the addition of special telephone service options to the basic 911 operations. These service options are discussed in Section D of Appendix B. The availability and cost of these options vary depending on the capabilities of the serving telephone companies. The application and availability of these options to local 911 systems should be discussed with local telephone company or ICC representatives.

D. Selective Routing

Selective routing automatically directs the call to a predetermined answering point. The answering point is selected by political jurisdiction rather than telephone exchange; i.e., the call is routed to the "correct" public safety agency, rather than the one determined by the exchange where the call originated. With selective routing, the 911 call is connected through dedicated trunk facilities to a central office where an electronic-stored program switcher is used to determine the PSAP to receive the call. The correct PSAP is determined by automatically forwarding the calling party's telephone number to the selective routing office where the number is used to search the file of the stored program switcher. This file contains a PSAP route identification corresponding to each 7-digit telephone number in the selective routing network.

Generally, because of their higher call volumes, the calls are routed on a basis of the serving law enforcement agencies. Selective routing thus partially solves the problem of jurisdictional and telephone boundary mismatch and generally eliminates the need for cooperation between law enforcement agencies. Selective routing does not solve the fire protection, emergency medical, and law enforcement inter-governmental problems because it can determine only the boundaries of a jurisdiction but not the need for the 911 call. For example, when calls are selectively routed to a law enforcement agency, it is necessary for that law enforcement agency to answer all 911 calls originating in its jurisdiction and then to route non-law enforcement calls to other public safety agencies in the law enforcement area (using the basic 911 methods described above). The handling of these calls for fire protection, ambulance, and other specified agencies can require the law enforcement agency to increase the size of its 911 call answering staff. In summary, selective routing provides a partial technical solution for what are essentially political, organizational, and intergovernmental problems.

Because of the sophistication of the telephone equipment required for selective routing, its implementation and operation can be expensive. The installation of selective routing is estimated by the Illinois

Telephone Association at two to three dollars per main station (telephone number) served by the central office. The monthly operating costs are estimated at 8 to 12 cents per main station. The lower estimates apply to the more urbanized areas of the state whereas the higher estimates apply to the less densely populated areas of the state. For example, the estimated cost of installing selective routing in Du Page County is \$450,000 and the annual operating cost is estimated to be \$288,000. These costs are well in excess of the cost of basic 911; i.e., an area using selective routing pays the cost of basic 911 and the costs presented for selective routing (see discussion of Cook County in Appendix B for details).

Before considering selective routing as a solution to the implementation of 911 in a politically volatile locality, the committee should contact the serving telephone company to determine the availability and costs of this service. The impact on personnel requirements within each of the public safety agencies must also be assessed before a decision to implement selective routing is made.

E. Proposed 911 System Standards

The proposed 911 System Standards presented in this section were developed with the cooperation of the State 911 Committee. The standards are separated into operational and technical areas. The operational standards are those which assure proper system responsiveness whereas the technical standards assure system performance and reliability. The mandatory standards presented here must be met by all 911 systems to provide the minimum system responsiveness and reliability. Additionally, desirable features are presented which should be considered by all agencies with sufficient resources and, particularly, by those serving large populations.

1. Mandatory Operational Standards

The following operational standards, if adopted, must be met by all 911 Public Safety Answering Points (PSAPs):

- The primary published emergency number will be "911." The individual agencies may retain their existing 7-digit emergency telephone numbers as a secondary telephone number and must have a separate administrative number.

- All agencies providing law enforcement, fire protection, emergency medical and rescue services within the boundaries of the 911 system must be included in the 911 system. Agencies must determine the type of 911 call handling method desired and provide written procedures so that PSAPs can initiate dispatch operations of each of these public safety services.
- The PSAP must operate 24 hours a day, seven days a week.
- A sufficient number of incoming 911 lines will be provided between the telephone company central office(s) and the PSAP to supply at least a P.01 grade of service (no more than one busy in 100 attempts during the average busy hour).
- Access to 911 will not be permitted with automatic dialing type alarms. The use of these types of alarms could easily saturate the 911 lines in the event of a major disaster such as a storm, flood, or tornado.
- Each 911 call answering position will have access to all incoming 911 lines and all outgoing private dedicated lines. In those systems employing an Automatic Call Distributor (ACD), it will not be possible or necessary for all lines to appear at each answering position.
- The 911 call answerers will receive both an audible and a visual indication of the incoming 911 calls.
- All incoming 911 calls will be recorded on a master logging recorder equipped to record both sides of the conversation and date and time of receipt of each call. These recorders may be configured to record each incoming line on a separate channel or to record each call answering position on a separate channel.
- Master logging tapes shall be retained for as long as deemed adequate but not less than 30 days.
- The date and time of receipt for each 911 emergency call shall be documented (written or tape recorded).

- If all 911 answering positions are busy, the calls waiting shall reach a recorded message informing the caller that:
 - The PSAP has been reached, and a call answerer will respond as soon as possible
 - Major (or highly visible) emergency incidents, once reported, will be placed on the recorder to advise callers action has been taken. The caller will be advised to remain on the line if the call is not related to this incident (this may be optional).
- In the call transfer method, 99 percent reliability of transferred calls from a PSAP to the responding agency will be maintained. The 99 percent reliability factor is based on the equipment capabilities. Additionally, when employing the call transfer method, the system should be designed so as to provide for transfer without placing the calling party on hold.
- All transferred calls will be monitored by the 911 call answerers to insure the call has been properly transferred and answered. These standards on call transfer assure virtually 100 percent reliability in the call transfer operation.
- When call relay is employed, a confirming procedure should be established so that the dispatched agency can acknowledge receipt of the incident information.
- Written procedures for center operations will be provided.
- ICC-approved training in operations will be provided.
- Each PSAP shall maintain records of its operations. As a minimum, these records shall include a summary of the number of calls answered, their disposition (the number of calls directly dispatched, transferred, relayed, and referred for each of the served agencies) for each shift, and a log of equipment outages. Additional information will include the average call processing times for each served agency.

- If direct trunking^{*} (as opposed to tandem trunking) is used, there will be at least two 911 lines between the PSAP and each of the central offices in its service area.
- If tandem trunking^{*} is used, the grade of service provided over the interoffice trunks will be at least the same level as exists for the Direct Distance Dialing (DDD) network.
- Standard tone signals (audible ringing, busy tone, and all trunks busy) will be provided to the 911 calling party in the normal manner used in the serving office.
- All exposed 911 circuit facilities will be protected and marked to prevent accidental contact.
- Maintenance will not be performed on the telephone circuits of the 911 system until permission is obtained from the PSAP director or his designate.
- Telephone company supervision shall assure that all telephone company employees whose normal activities may involve contact with facilities associated with 911 service are familiar with safeguarding of facilities and procedures.
- The PSAP will be equipped with a sufficient number and type of call registers to accurately monitor the usage of the incoming 911 lines.
- On request from any served agency or the PSAP, detailed traffic studies will be made on the 911 lines by the telephone companies to determine if the required grade of service is being maintained. As necessary, the telephone company will provide the involved agency with an appropriate report on the grade of service for the terminating lines/trunks. The cost of these measurements will be borne by the requesting agency.

^{*} Direct and tandem trunking are defined in Section B-1 of Appendix B.

- The PSAP will have sufficient physical security so as to minimize the possibility of intentional disruption of operations.

2. Desirable Operational Features

In addition to the above mandatory operational standards, each PSAP should provide the following features where possible:

- Sufficient 911 call answerers will be provided such that during the average busiest hour of the day at least 90 percent of the calls will be answered within 10 seconds (two or three rings). In areas of sparse population it may not be economically or operationally justifiable to provide this level of service. This level should probably be provided in all systems serving densely populated areas.
- Each 911 call answering position will be equipped with an instant playback type of recorder to record each incoming 911 call. These recorders are not used for operational documentation, but are employed by the call answerers to clarify information in the event the incident information provided by the caller is not understood and the caller is no longer available.
- Each PSAP will be connected by private telephone lines or other communication links to each adjacent PSAP.
- Public safety radio dispatch centers not collocated with the PSAP will be connected to the PSAP by private telephone lines.

3. Mandatory Technical Standards

The following technical standards, if adopted, must be met by all 911 Public Safety Answering Points (PSAPs) and their serving telephone companies.

- There will be a minimum of two incoming 911 lines to each PSAP regardless of the P level of service.

- The PSAP will have at least one unlisted telephone number for use by telephone company operators and public safety agency officials when all 911 trunks are busy.
- When an Automatic Call Distributor (ACD) is used to terminate 911 calls, the recorded announcement option will be used. This feature provides an automatic recording to the caller informing when all operators are busy or that a major incident has already been reported.
- Whenever the call transfer method is employed, special equipment considerations must be made. This method calls for the 911 call answerer to directly connect the incoming 911 line or trunk to another communication line, to signal out on the second line, and complete the call through to a third party who will initiate action.
- Whenever the call transfer method is employed, the secondary circuit in the transfer shall be a properly designed, dedicated facility, such as a switchboard (PBX or PABX) extension, or direct tie line/trunk, or microwave facility.
- All 911 telephone systems must be approved by the ICC before implementation.
- The PSAP will have either customer supplied or telephone company installed and tariffed standby emergency electrical power capability to ensure continuous operation and communication (radio, telephone, etc.) in event of a commercial power failure.

4. Desirable Technical Features

In addition to the above mandatory technical standards, each PSAP and serving telephone company should provide the following features where possible:

- Alternate telephone cable entrances into PSAPs for telephone communications.

- Underground or buried cable entrance facilities shall be provided to the PSAP.
- Alternate means shall be provided for communicating between the PSAP and the public safety agencies. These alternates include radio and microwave systems.
- Alternate entrance routes shall be provided for the PSAP primary power. If the PSAP is situated such that power can be received from more than one substation, connection to both substations should be investigated.

VI ALTERNATIVE 911 CONFIGURATIONS AND PSAPS

Having carefully laid the groundwork through the preceding planning steps, the 911 Committee should now address the issue of selecting alternative 911 system configurations (and their associated PSAPs) for final evaluation. At this point in the planning process, it will be evident that solutions to the boundary mismatch problem will require interjurisdictional and interagency cooperation. A need for cooperation is emphasized in HB 911 which urges 911 system centralization and requires interagency and interjurisdictional 911 agreements. The vital elements for the success of this planning step are, therefore, a solid understanding of the local situations (developed through the previous planning steps) and a spirit of cooperation among the participants in the planning process.

Maps of some possible 911 alternatives and their associated costs have been provided in Appendix B to assist the 911 Committee in evaluating alternative 911 configurations. The guidelines by which these alternatives were formulated and costed are also included. It is recommended that the 911 Committees study Appendix B carefully before proceeding with the development of alternatives.

In evaluating the alternatives in Appendix B, the 911 committees should go through a four step process:

- 1) Study the boundary mismatch problem in each central office area to identify requirements for interagency and interjurisdictional cooperation. For example, one alternative may group adjoining jurisdictions while a second alternative may have these jurisdictions served by separate PSAPs.
- 2) Evaluate the Appendix B alternatives to validate their configurations and to identify other alternatives that should be considered.
- 3) Identify candidate agencies for PSAPs and identify all included agencies for each 911 alternative. Determine the call handling mechanism to be used for each included agency.
- 4) Study the costs and cost elements for both Appendix B and new alternatives.

A. Boundary Mismatch

The problem of non-coincidence between telephone central office service area boundaries and the service areas of the public safety agencies was introduced in Section IV-D. Because the technical solution of selective routing is unproven, expensive, not currently available and only partially effective in resolving 911 conflict situations, the recommended technique for accomodating boundary mismatch is to build up alternatives using combinations of central offices. Only when this solution is proven unfeasible--because of inter jurisdictional, operational, or other problems--should the 911 committees consider the selective routing solution.

Basically, this means that 911 committees should develop 911 systems by grouping central offices in such a way as to minimize boundary mismatch. Note that the larger the area included in a given 911 system, the smaller the cost of the system to each participant, i.e., central office combinations should be as large as is feasible.

1. Rural Counties

In those counties of the state where the population, number of cities, and size of cities is small, the boundary mismatch problems are not generally severe. 911 systems that include all central offices in a county or a region are probably reasonably consistent with the service areas of the principal law enforcement (sheriffs and ISP), fire protection (rural FPDs), and emergency medical (municipal, private, and volunteer ambulance) agencies.

2. Mixed Counties

As the population of the counties and the sizes of its included municipalities increase, the possibility that the municipalities may want separate 911 systems also increases. The alternatives in Appendix B include subcounty systems for municipalities of 5,000 or more. This is not a recommendation for such an alternative but recognition of the possibility that municipalities of this size or larger may want separate 911 systems. In these intermediate sized counties, the selection of central offices to be included in each 911 system becomes more complicated as the number of jurisdictions and agencies in each central office area increases.

3. Urban Counties

In the urban counties of the northeast and some of the other more heavily populated counties of Illinois, the number of large and/or heavily populated jurisdictions in a given central office area can be significant. Additionally, the fragmenting of jurisdictions into several central office areas is more common. In these counties, even the best configured alternatives may have the calls of single jurisdictions handled by two PSAPs.

4. Summary

In general, the problems caused by boundary mismatch are potentially the most difficult in the urban counties with their abutting jurisdictions and the least difficult in the lightly populated rural counties. Each 911 committee should clearly identify the magnitude of their particular boundary mismatch problems by studying the correspondence of jurisdictional/agency/telephone company boundaries.

B. Alternative 911 Configurations

Appendix B contains system configurations and costs for approximately 450 alternative local 911 systems. These alternatives were configured through consideration of: population and population density, central office boundaries, jurisdictional boundaries, agency boundaries, suggestions from local personnel (solicited by interviews and questionnaires), and studies performed of public safety systems in Illinois. This set of alternatives is not expected to be inclusive of all alternatives that the 911 committees will want to consider. They should, rather, be considered as examples of alternatives that should be considered by the 911 committees.

Each 911 committee should study these alternatives in the light of their local situations as developed in the earlier planning steps. By studying these alternatives, their deficiencies can be brought out and the need for additional alternatives identified.

In their study of the Appendix B alternatives, the 911 committees should address a number of questions about the alternatives:

- Are boundaries between the major agencies recognized in one or more of the alternatives?
- To what extent do the areas covered by the 911 alternatives match those of the agencies and jurisdictions?

- Are the agencies and jurisdictions in the various 911 configurations compatible in terms of operations and political/management conditions?
- Do the 911 configurations recognize natural boundaries?
- Are central offices which straddle the county boundaries assigned to the public safety agencies (generally sheriffs) responsible for the bulk of the population in those exchanges?

This set of questions will serve to focus the considerations of the 911 committees on key aspects of the alternative configurations. If the answers to some of these questions indicate that additional alternatives should be developed, and/or that the alternatives provided in Appendix B should be modified, the 911 committees should proceed as described in the remainder of this subsection.

1. Rural County Alternatives

In the alternatives provided for rural counties in Appendix B, the smallest population unit considered for a separate 911 system was a municipality of 5,000 population. As this is a small population base for a 911 system (one person can provide call answering for 20,000 people or call answering and dispatch for 18,000 people), the 911 committees should consider ways of expanding the area served by the municipality by adding additional central office areas to the system.

There are two important reasons for the rural 911 committee to consider a system covering more than one central office:

- In rural areas it is unlikely that the central office serves only the municipality. In most cases, large unincorporated areas will be included as well, necessitating extensive transfer operations with the sheriff, ISP, and any fire districts that are involved. This can be eliminated by developing a larger system where all affected agencies participate.
- Adjoining municipalities that commonly work together can form a larger system that will serve all their needs and will probably reduce the communications costs of each agency. That is, where there were formerly two individuals answering the phone, one would suffice.

Expansion of the area served by a municipality can be based on several possible criteria: inclusion of the service area(s) of one or more fire protection district; matching of the service area for 911 to natural boundaries; adding adjacent municipalities that commonly work together; conforming to emergency medical catchment areas, etc. If the 911 committee makes a change in the boundaries of one 911 system, that change must, of course, be accounted for in the boundaries of the adjacent 911 systems in the planning area. It is possible that the realignment of the boundaries of one 911 system may produce a number of other changes in adjacent 911 system boundaries.

The logical limits of expansion around a small municipality are included in Appendix B. Thus, county, multicounty, and ISP district 911 system alternatives are described and costed in the appendix.

In configuring alternate 911 systems within these bounds, the 911 committees should be guided by:

- The questions provided earlier in this section
- Recognition of the general fact that the larger the 911 system areas the more cost-effective the system (compare costs of alternatives in Reference 1.)
- The political and agency problems that exist in their area.

2. Mixed County Alternatives

Mixed counties are jurisdictions where a significant part of the population lives in an incorporated jurisdiction. Thus a part of the county may be rural while other parts are urbanized. This creates a rather more complex planning problem for the 911 committee. Namely, when the population of a municipality exceeds that of the unincorporated county jurisdiction, the city often has larger public safety services (police, fire, and emergency medical). This increases the possibility that such a municipality will want to develop its own 911 system, or will want to serve as the public safety answering point (PSAP) for a countywide system (see Section VI-C and Appendix B).

If more than one large municipality exists in an area, 911 problems are compounded as both may want either their own systems or to operate a countywide system. Thus, while a mixed-county offers more local options, it also increases the difficulty of reaching agreements acceptable to all. This is particularly acute in areas where one part of the county is urban while a substantial portion is still rural. Rock Island will be used as an example of such a county.

The possibility for combinations of urban and rural communities into 911 system areas is quite high--see Appendix B--in Rock Island County. Rock Island County could have one, two, or three urban 911 systems. Additionally, the rural area of that county could have one or two 911 systems. Finally, all areas could be handled from a single PSAP or the rural areas could be handled by the state police district (which could also handle rural areas for other counties in its district).

The 911 committees in the mixed counties must deal with the problem of having several independently powerful jurisdictions in the planning process. In effect, this means that more interjurisdictional cooperation will be needed to identify and select 911 alternatives and that more alternatives are possible. The 911 committee in this type of area must concentrate on developing such interjurisdictional cooperation so that cost-effective, workable 911 systems are developed.

3. Urban County Alternatives

In the urban counties, the development and selection of alternative 911 systems is at its most complex. Large and abutting jurisdictions have municipal police, fire, and ambulance services which have been developed to supply the needs of their citizens. Because of dissimilar growth patterns, jurisdictions may share central offices with all or part of adjacent jurisdictions and may themselves be served by two or more central offices.

As suggested in Section II, 911 committees for these urban counties are expected to represent groups of jurisdictions either within central office boundaries, within special regional groups (such as the DUCOM, NORCOM, and Cook County radio districts), and/or within counties. Urban 911 committees must evaluate the jurisdictional boundary mismatch problems at the central office boundaries in order to determine the possible combinations of central offices that form 911 systems. To illustrate this process, the following discussion on suburban Cook County (excluding Chicago) is provided.

In Appendix B, three alternatives for 911 are developed for suburban Cook County. The first alternative groups jurisdictions to minimize the boundary mismatch problem. The second uses selective routing to match 911 system areas to the radio districts. The third uses selective routing to match the 911 system areas to political boundaries.

In the first grouping, the extent of boundary mismatch is minimized using a method similar to that used in the rural and mixed counties, namely identifying the best match of jurisdictional and telephone central

office boundaries. Unlike the rural and, to a lesser extent, the mixed counties, however, the system illustrated for Cook County would require a major effort in interjurisdictional cooperation.

Nevertheless, the cost of selective routing should prompt the 911 committees to search for 911 system boundaries that at least minimize the amount of selective routing required. Thus, the 911 committees should identify combinations of central offices that minimize the boundary mismatch problem while matching areas of current or potential interjurisdictional cooperation. (It should be remembered while making these determinations that call handling techniques such as digital call relay between adjacent 911 centers can minimize the impact of boundary mismatch at costs considerably below that of selective routing.)

In cases where a match between central office and jurisdictional boundaries does not appear possible to a 911 committee, it should consider the use of selective routing to divide a central office into its jurisdictional components. (The telephone company representatives can describe the requirements for selective routing and potential costs for implementation in each area.) An example of this technique is included in Appendix B for suburban Cook County.

In that example, selective call routing is used to group jurisdictions according to interjurisdictional radio districts that either currently exist or are under development in suburban Cook County. This alternative matches the boundaries of the 911 systems to those of the radio districts by using selective routing in only those central offices that are on the boundaries of the radio districts. A considerable part of the cost--one-half, using assumptions discussed in Appendix B--for complete selective routing (all central offices) is saved.

The third alternative for Cook County shows complete selective routing of all central offices in the area (with the exception of those that have no central office/jurisdiction boundary mismatch). In that alternative, selective routing connects 911 calls to selected PSAP locations in each jurisdiction.

Selective call routing could be used when two or more large jurisdictions in a common central office area have incompatible public safety communication plans. In that case, selective routing would route calls to different PSAPs according to the telephone number of the calling telephone.

In summary, urban counties should use their best efforts to minimize the use of selective routing because of its high costs. Where it is necessary to employ selective routing, careful consideration should be made of current and future jurisdictional and agency plans.

C. Selection of PSAPs and Call Handling Techniques

Except for determining alternative costs (see next subsection) and the selection of a management method (see Section VII), the selection of PSAP locations and call handling techniques (see Section V) will complete the description of the 911 alternatives.

In Appendix B, PSAPs were located in the largest law enforcement agency or joint dispatch facility in each 911 system area (except for ISP locations). This selection was based on the fact that the law enforcement agencies normally receive 80% to 90% of the emergency calls and are, therefore, generally the best equipped to assume the 911 communications load. In some areas, however, this may not be the best selection so the 911 committees should evaluate the PSAP locations for the Appendix B alternatives and any additional alternatives they have developed.

PSAP locations can also be determined by maximizing the population to be served by direct dispatch. A single, properly trained person can handle all 911 call answering and dispatching for up to 18,000 people. To provide maximum use of personnel, the 911 committee will want, therefore, to use 911 personnel in the direct dispatch mode to the maximum extent possible. For somewhat smaller population bases, a 911 operator can provide 911 answering for all agencies, dispatch for some agencies, and provide call transfer, call relay, or call referral for the balance of the agencies. Guidelines for determining these populations are provided in Appendix B.

Another consideration in selecting PSAP locations is the capabilities of the central offices that serve the candidate dispatch centers. Telephone company members on the 911 committees can provide the committees with information on any advantages and disadvantages of using particular central offices.

The final consideration in PSAP selection is to minimize telephone line costs. Most of these costs are computed on a per mile basis so there are cost advantages to selecting PSAP locations that reduce PSAP-to-agency and PSAP-to-central office distances.

Each 911 committee should, then, go through the following process in completing the descriptions of alternatives they want to consider for final selection:

- In each 911 system area, identify agencies that want to operate with either direct dispatch, call transfer, call relay, or call referral.
- Determine the dispatch locations of the largest (in terms of call volume) agencies desiring direct dispatch 911.
- Evaluate space availability in the dispatch centers for the 911 personnel and possible dispatch for additional agencies, if desired. Include consideration of direct dispatch of ambulances.
- Determine distances from these dispatch centers to central offices and other agencies.
- Determine relative capabilities of central offices in candidate PSAP locations.
- Select PSAPs based on the above considerations.
- Describe call handling techniques to be used for each agency.

D. Costs of Alternative Systems

The initial (implementation) and recurring (ongoing) costs of 911 systems are described in Appendix B. These costs were developed using telephone charges (provided by the Illinois Telephone Association), typical salaries for answering personnel, and estimated costs of logging recorders. If a 911 committee develops new alternatives that it wants to cost, it should go through a costing process similar to that described in Appendix B and briefly discussed in this subsection.

The costs of alternative 911 systems must be considered in terms of both implementation costs and, more importantly, ongoing operational costs. The principal implementation cost elements are: new facilities (if required), telephone system implementation, and telephone logging recorders. The principal operational cost elements are the call answering personnel and the telephone system.

Facility requirements are heavily dependent on the number of call answering and dispatch position requirements. Guidelines to assist 911 committees in determining the number of call answering and dispatch positions are presented in Appendix B of this manual. A common rule-of-thumb is that each position requires approximately 60 square feet of floor space to allow for the console and passage space. Costs for facilities are not included in Appendix B because of the innumerable options available. 911 committees should, however, evaluate the desirability of alternatives considering the needs for modifying or building facilities.

The telephone system is comprised of: incoming 911 lines, outgoing private lines, listed and unlisted business lines, and the call answering telephone equipment. To determine the installation and recurring costs of these lines and equipment, the telephone company serving the PSAP must know the number and type of telephone lines, the distances between points to be interconnected by dedicated lines, the number of answering positions, and the total number of lines to be terminated at each position. The telephone company serving the proposed PSAP can assist in developing this information and provide estimates of the telephone system installation and operating costs.

If selective call routing is to be considered as an alternative, preliminary cost estimates have been developed by the Illinois Telephone Association. These estimates are \$2 per telephone main station (telephone number) for installation and a monthly cost of \$0.08 per main station for file updating. These costs are based on the estimates of providing selective call routing in the Chicago metropolitan area. The actual costs will vary depending on the specific telephone network arrangement and the finalization of the system development work. The following 911 cost items are not included in the cost estimates: telephone station equipment at the PSAPs; transfer arrangements from the PSAPs to remotely located emergency dispatching operations; optional 911 features, including Automatic Number Identification and/or Automatic Location Identification displays; special requirements such as alternate routing arrangements, backup emergency power, cable facility diversity, and access to computer data files; and telephone company return on investment.

In other parts of the state, the installation and operating costs of selective routing could be almost twice the estimates presented above because there are fewer central offices available which are capable of being used for selective routing. This results in much longer trunks from the central offices and PSAPs to the nearest selective routing office, thus creating higher costs. Another factor that must be considered is the potentially prohibitive costs of selective routing to the smaller telephone companies.

The cost of logging recorders can vary significantly depending on the type of recorder and the features provided. Table 4 provides a guideline to the cost of these recorders as a function of the number of audio recording channels. Exact costs must obviously be obtained from manufacturers at the time of system implementation. The cost of the time recording channel must be included when using this table. For example, if 9 audio channels are required, a ten-channel recorder would be needed (nine audio channels and one time channel) and would cost approximately \$9,400.

Table 4

ESTIMATED COSTS OF LOGGING RECORDERS*

<u>No. of Channels</u>	<u>Estimated Costs</u>
1-4	\$ 4,200
1-10	9,400
11-20	13,000
21-40	26,000
41-60	39,000

There is a choice of two configurations which may be used to connect the telephone system to the logging recorders. The first method (which is used in Appendix B) is to connect each 911 line to a separate logging recorder channel. This method records the entire conversation on the 911 line, even if the call is transferred. The second method is to connect the telephone set of each call answering position to the logging recorder. Using this second method, only that portion of the call when the call answerer is on the 911 line is recorded (no recording after a call is transferred). This system requires less recording channels and is less costly. Finally, an existing dispatch center may have a recorder with unused capacity which could be incorporated into the 911 system. The 911 committees should determine which configuration they will use for each alternative in order to determine the cost of logging recorders. As used in Appendix B, logging recorder costs are 80-90 percent of initial costs.

The number of personnel required to staff a 911 system can be determined using the process described in Appendix B. Either call data or a population-based estimate can be used to estimate call handling requirements.

* Derived from manufacturers' literature--1976.

The number of personnel needed to provide the 911 function must then be compared to the number of personnel available in existing public safety communications facilities in order that the need for new personnel can be determined.

For the alternatives described in Appendix B, certain assumptions on personnel requirements were made based on rural-urban population call volumes. The 911 committees, with actual call data developed for each agency, will be able to refine these estimates both for the Appendix B alternatives and new alternatives that they have developed.

The 911 committees can, then, determine personnel requirements for each 911 alternative by the following process:

- Determine the call volumes to be handled by direct dispatch, call transfer, call relay, and call referral by each PSAP.
- Using the closest match to the call handling percentages provided in Appendix B (Table B-3), determine the number of personnel needed to provide 911 call answering and dispatch (if single stage direct dispatch is used). If two stage operation is used, determine the number of 911 answering positions required.
- Determine the availability of personnel in the candidate PSAPs to provide the levels of staffing needed.
- Determine additional personnel needs (if any) to provide 911 services for each alternative.
- Determine the cost of new personnel for each alternative.

E. Summary

This section has described the rather complex process of evaluating, configuring, and costing alternatives. Each 911 committee should make a major effort to assure that the alternatives that emerge from this process are those that have support from some segment of the committee. In Section VIII, a structured process for evaluating these alternatives will be described.

VII MANAGEMENT TECHNIQUES

A. Introduction

There are two basic management forms--joint powers and contract--commonly used to implement and operate a multi-agency 911 system. Due to the nature of 911, all 911 systems will need to be managed by one form or the other.* Even a single city 911 system will require some form of interagency agreement because fire, police, and ambulance agencies must be included. The most basic management form is a straight contract between two agencies or jurisdictions where one agrees to provide a specific service for the other. One common example is a contract between the sheriff and a town when the sheriff provides law enforcement for the town. Joint powers agreements are generally rather more complex and often involve a number of participants.

This section will first present a description of each form and will discuss their applicability to different situations. Next, we will present a checklist which can be used to indicate the most appropriate management technique for any given system. This checklist should be completed for each alternative 911 configuration.

B. Joint Powers Agreements

A joint powers agreement is an intergovernmental agreement which creates a separate authority to perform a specific function. For example, all signees of the agreement would have one representative on a policy board created by the document. This policy board would collect and disperse operating funds, make overall policy decisions, and hear grievances. It would be fiscally and legally responsible for the provision of service in the designated area. Operating policy would be developed by a representative committee of user agencies who would determine how calls should be handled, what levels of service were to be provided, and other actual day-to-day decisions.

The joint powers agreement is particularly valuable in defusing a politically volatile situation. It provides an alternative to simple management by existing agencies, as well as a neutral control of resources. It also provides a clearly identified authority which is accountable to the state, the user agencies, and the citizens. Thus, such an agreement is the most useful where there are two or more jurisdictions of comparable size and resources who are willing to cooperate in a joint venture of this kind.

* This does not exclude special districts, but they are harder to implement and less acceptable for this type of service.

In order to promote the acceptability of a joint powers management plan, several subjects should be carefully addressed by any group wishing to develop this form of 911 management:

- Any cost-sharing mechanism to determine user contributions should be based on some neutral criteria--such as population served, volume of calls per month, or size of original communications budget.
- Continuity of funding should be written into the agreement so that each agency's contribution is automatic. This might be accomplished by having both cities and counties dedicate a portion of their tax rate (determined by their total contribution) with the revenue paid directly to the 911 system.
- The prerogatives and obligations of signees should be clearly specified in the document itself, as should the prerogatives and obligations of the 911 communications system operation. This will reduce ambiguity and disagreement after the system has been implemented.
- Grievance procedures should be clearly stated, and be open to users and providers equally. The form of these proceedings should be publicized and easily accessible to all concerned.
- Levels of service to citizens and user agencies should be stated in the document in order to establish response criteria and to eliminate ambiguity. These levels of service must also meet statewide standards.

There are two major problems associated with this type of inter-governmental agreement, particularly when dealing with an area as sensitive as public safety communications. First, if there are several jurisdictions involved it may be difficult to develop an agreement acceptable to all of them. If it is apparent that this will be the case, the only solution is consideration of another alternative. The second problem is not quite so easily dealt with and will arise whenever a joint powers agreement is signed which places the 911 communications facilities in an existing agency. For example, a group of cities signs an agreement with the county, but the 911 communications are operated from the sheriff's facilities. Since communications would be a separate function, the sheriff would no longer pay the wages of all of the communications personnel. This could create personnel problems.

C. Contractual Agreements

Contract management of emergency communications is probably the simplest and most straightforward form. Essentially, an existing agency agrees to provide communications for others in the area. Thus the provider agency would be responsible for 911 answering and would bill user agencies according to some prearranged criteria. It is most feasible in areas where there is one acknowledged agency with the capability to operate a 911 system, or where other major agencies in the area agree that an acknowledged primary agency should operate 911.

The following are some considerations which should be thoroughly discussed by all participants and written into the contract:

- The billing criteria must be specified in the contract and should be unalterable unless a new contract is drawn and signed. This will eliminate user fears that the costs will grow arbitrarily. If the provider agency undertakes to finance the system, that should also be clearly stated.
- A user board should be established to develop and monitor operating policies and levels of service. It should have clearly defined recourses if the contract agency does not meet agreed-upon criteria.
- All operating policy and levels of service should be signed by contractor and contractee so that both are aware of the liabilities and prerogatives of their positions.
- The contract should provide for a grievance procedure which is accessible to user agencies and which has the authority to enforce provider compliance in cases of need.
- A provision for an annual user review should be written into the contract to provide an official forum for discussion.

Although this is a simple management form, it has more potential problems than those inherent in joint powers agreements. If the provider agency is viewed with any suspicion by potential user agencies, it may be extremely difficult to reach any consensus on operations and policy. This may be difficult to resolve, particularly if the contract form has inadequate provisions for user input. Even in an area where local agencies have historically worked closely with each other, these sorts of issues can arise.

D. Joint Powers and Contract Management--A Comparison

The major differences between joint powers and contractual 911 management are presented in Table 5. These differences focus on the location of fiscal control and responsibility for the provision of service. Management by joint powers agreement provides a new line of authority for emergency communications. The Policy Board formed by the agreement is ultimately responsible for provision of service and has fiscal control of the communications system. In contrast, management by contract utilizes preexisting agencies. Fiscal control and responsibility for provision of service is given to an agency which is already providing services in the area. There is no new communications authority, and user agencies do not have the built-in input that is possible with a joint powers agreement.

However, each form is appropriate for certain types of situations, and while one proposed 911 configuration would best be managed by a joint powers agreement, another would be suited to contract. It is important to develop alternative management agreements as part of the process of defining specific 911 configurations. An alternative can be technically and operationally viable, but if the proposed management scheme is not acceptable to the participants, that alternative is not viable. This is illustrated by the three sample configurations in Rock Island County which are presented in Figure 4.

In example one, a countywide system, all public safety agencies and municipalities would share one answering point with the county and its agencies. Consequently, any management agreement would have to be acceptable to the entire county. For a system of this size, knowing that there are several large cities, a joint powers agreement would probably be the most appropriate.

In example two, the county is divided into three roughly equal portions, and most of the population is contained in the central section. Consequently, this section would be most likely to develop a joint powers agreement. The northern and southern ends would be more likely to develop management by contract since fewer jurisdictions and agencies would be involved.

In example three, the main centers of population are separated so it seems likely that each jurisdiction would operate 911 via an inter-agency contract. Again, a contractual agreement would probably be most suitable for the northern and southern parts of the county.

Table 5 COMPARISON OF JOINT POWERS AND CONTRACTS MANAGEMENT

MEASURES	JOINT POWERS	CONTRACTS
Applicability	<p>Areas with equivalent municipalities or agencies</p> <p>Valuable in a politically volatile situation</p>	<p>Areas where one agency is acknowledged leader</p> <p>Most straightforward management form</p>
Authority	Policy Board	Existing agency
Fiscal Control	Policy Board	Existing agency
Provision of service	Policy Board	Existing agency
Operating Policy	Users committee	Users committee
Grievance Procedures	Formal through Policy Board	Must be set up with contract
Levels of service	Policy Board	Must be set up with contract



EXAMPLE ONE



EXAMPLE TWO



EXAMPLE THREE

SA-4477-18

FIGURE 4 REPRESENTATIVE ALTERNATIVES FOR ROCK ISLAND COUNTY

In each of these examples, special arrangements would have to be made with adjacent agencies and their PSAPs to arrange for appropriate handling of calls. As a general rule of thumb, the smaller the 911 system, the more agreements with adjacent agencies that will have to be developed.

E. Deciding on Management Format

Although the management format for each alternative can be discussed by the 911 committee as a whole, it is reasonable to consider this step in subcommittees of potential system members. Only those jurisdictions which will share a center need discuss the possible management of that center. Once the forms of management are understood, two considerations will indicate management techniques which would be the most successful:

- Is the alternative under discussion one with several agencies that each could technically operate a 911 system, or is a single agency most capable of providing 911? If there are several agencies of similar capability, it will probably be more productive to consider joint powers as the most feasible technique. If all agencies agree to allocate this function to one particular group, a contractual agreement would also be possible.
- If there is a single agency most capable of providing 911, will others in the area agree to a service so provided? The failure to reach an agreement on contract management indicates that the system would not be functional. In that event, the agencies should determine either that a joint powers agreement can work or the alternative should be eliminated as invalid.

If the initial meetings of potential 911 system members are able to produce a management form conditionally acceptable to all, then the alternative should be considered as viable for final consideration and analysis.

One final point: The rules on facilities having access to Computerized Criminal Histories apply to LEADS, NCIC, etc. These rules are under review at both state and national levels and can impact on the management provisions of interagency and intergovernment agreements. Local 911 Committees are urged to contact the ICC to determine the impact of these rules on their management agreements.

VIII SELECTION OF ALTERNATIVES

The 911 committees should now be ready to use the information they have accumulated as a basis for selecting 911 systems to serve their planning area. Each 911 system to be evaluated will have five basic features: 1) a specific geographic area which contains a number of jurisdictions, agencies, and telephone exchanges (plus, perhaps, parts of other jurisdictions and agencies), 2) a set of call handling procedures for the included agencies, 3) a selected PSAP, 4) estimated initial and recurring costs, and 5) a method of management. This section will provide a method for ranking these (and other) 911 system features.

Table 6 contains a matrix which the 911 committees can use to rank the alternatives (the elements in this table will be discussed later in this section). It is probable that members of 911 committees will not all agree on the ranking of benefit measures for each alternative--particularly benefits which are not easily measured--so each member should have the opportunity to independently rank them. After its individual members have ranked the alternatives, then a 911 committee should meet to evaluate the rankings and develop a consensus of the committee members.

Table 6 contains a mix of quantitative (measurable) benefit measures and qualitative (unmeasurable or subjective) benefit measures. For example, the cost of the telephone system is a quantitative measure, while the desires of an agency for a particular configuration is a qualitative measure.

In using Table 6, the 911 committee members should rank the alternatives for each benefit measure. The best alternative should receive the lowest number (one), the worst alternative should receive the highest number (equal to the total number of alternatives being considered), and the other alternatives should receive rankings in ascending order of undesirability. For example, if four alternatives are being ranked for "Installation Costs," the alternative with the lowest installation cost would be ranked 1, the alternative with the next lowest cost would be ranked 2, the third lowest cost alternative would be ranked 3, and the most expensive alternative would be ranked 4. Each alternative should be ranked by each benefit measure and a composite (average) ranking should be developed.

The first step in the selection process is to assign each alternative a number to be used in the Table 6 matrix. Each member should use Table 6 to develop ratings for each benefit measure and an average ranking for

Table 6 RANKING OF ALTERNATIVES

Benefit Measures*	Alternative Number								
	1	2	3	4	5	6	7	8	9
Installation Costs									
Facility Costs									
Personnel Costs									
Monthly Telephone Costs									
Costs to Telephone Companies									
Boundary Match									
Calls Using Direct Dispatch									
Call Handling Agreement									
Match to Current Agreements									
Central Office Capabilities									
Reliability of Power									
Personnel Utilization									
Agency Desires									
Jurisdiction Desires									
Public Benefit									
System Management									
Total Initial Costs									
Total Recurring Costs									
Average Benefit Ranking									

*All benefit measures need not be used. Each 911 Committee can select a subset of these measures that they wish to use. Clearly, additional benefit measures can also be selected.

each alternative. In the balance of this section, we will discuss the benefit measures.

The first two benefit measures are initial 911 system costs. Telephone costs for lines and equipment and recorders^{*} are presented for the alternatives in Appendix B and can be developed for additional alternatives as discussed in Section VI-E. If an alternative, by requiring the addition of 911 to a facility, requires facility modification costs, or if a new facility is needed for a PSAP, those costs should be determined (roughly) and used to rank the alternatives--least expensive to most expensive. The sum of these two costs should be used under "Total Initial Costs" (third row from bottom) to provide an overall initial cost ranking.

"Personnel Costs" and "Monthly Telephone Costs" (the next two benefit measures) are the ongoing costs of the 911 systems. All personnel and telephone costs for all 911 systems in the 911 planning region should be included. For example, if an alternative in a 911 planning region consists of two municipality 911 systems and one county 911 system, the sum of the costs of personnel and monthly telephone charges for all three systems should be determined and used in the ranking process. If, on the other hand, one 911 alternative for a 911 planning area has that area as part of a larger (ISP region, multicounty, etc.) 911 system, then the 911 planning area's share (worked out on a population basis) of the cost of the larger 911 system would be used in the ranking process.

The sum of the personnel and recurring telephone costs should be determined for each alternative and used in the "Total Recurring Costs" row (next to last row in Table 6) to provide an overall recurring cost ranking. The final cost element, "Costs to Telephone Companies," should be provided by the local telephone companies as an indication of the relative cost impact of the alternatives on the telephone companies.

The remaining elements in Table 6 are benefit measures, some of which are objective and some of which are subjective. The first of these is "Boundary Match," meaning the extent to which the alternatives provide a match between agency/jurisdictional and telephone boundaries. Here the best match should receive the best ranking (lowest number) and the poorest match the lowest ranking (highest number).

* See Section VI-D for a discussion of the wide range of initial costs implicit in the method of use of logging recorders. If some PSAPs have unused recorder capacity that could be used for 911, this capacity should be accounted for in ranking the alternatives.

As direct dispatch is the most efficient form of 911 call handling, the number of calls handled by that method should be used as a means of ranking alternatives. For example, if one alternative handled 60% of the 911 calls by direct dispatch while a second alternative handled 40%, then the first alternative should receive a higher ranking.

Equally important is the "Call Handling Agreement" benefit measure. The extent to which the agencies in a 911 system alternative are satisfied with the call handling techniques available to them in a 911 system will certainly influence the chances of success of that 911 system. This is basically a technical and operational problem in which the participants in a 911 system must reach agreement (on call handling techniques to be employed by that system) or select a different alternative. Ranking the alternatives with this benefit measure will, then, reflect the satisfaction of the agencies with the agreements that have been worked out in earlier planning steps (See Section VI).

In many areas, the agencies and jurisdictions in the 911 planning areas will have some current agreements for working together to provide services. Additionally, they may have participated in joint study efforts and have developed common bases for agreements. Matching of alternative 911 system boundaries to existing areas of agreement or to existing service areas is to be ranked under "Match to Current Agreements." Examples of good matches between agencies and 911 system boundaries would be: fire protection agencies bound by mutual aid pacts; emergency medical service areas; city police and/or sheriffs service areas; and ISP regional areas. 911 system alternatives that fragment these service areas are, then, somewhat less desirable than those that do not.

The "Central Office Capabilities" refers to the ability of central offices to provide sophisticated 911. By locating a PSAP in the service area of the more modern central offices, users may gain some services not possible from older central offices. Telephone company representatives should provide information on the rankings of the alternatives using this benefit measure.

The "Reliability of Power" at the proposed PSAPs can effect the selection of alternatives. Here the 911 committee should rank the alternatives on both the reliability of commercial power and the availability of backup power. Costs should also be considered in ranking by this benefit measure.

A very important benefit measure is that of "Personnel Utilization." The extent to which personnel already involved in public safety communication can be used for 911 operations is a measure of the cost-effectiveness of the system. Comparing the number of personnel required at the PSAP to the number of personnel already providing dispatching at the PSAP location is a good method of evaluating personnel utilization. Additionally, the effectiveness of personnel utilization can be ranked by comparing the total number of 911 and dispatch personnel required for the various alternatives. Clearly, the 911 alternative that requires the fewest additional personnel is the best according to this benefit measure.

The next two benefit measures--"Agency Desires" and "Jurisdiction Desires"--are included to provide the agencies and jurisdictions, respectively, with a means of ranking the alternatives based on their subjective feelings toward their desirability. These rankings can reflect such factors as: political interactions of the jurisdictions, service orientations of the agencies, anticipated improvement in service, and acceptability to the public.

The provision of 911 is, as pointed out earlier, a major "Public Benefit." Therefore, the ranking provided for this benefit measure should be based on such other factors as: minimum overall costs to the public, minimum delays in call handling, and the most effective use of public safety resources. Public members of the 911 committees can contribute their understanding of community desires to the ranking process by way of this benefit measure.

The final benefit measure that can be ranked is that of "System Management." The 911 committees will have previously (see Section VII) considered the management form and content for controlling and operating the 911 systems. These considerations will provide the committee members with a means of ranking the alternatives based on the relative difficulty in achieving management agreements among participants in each system. Thus, if a 911 system requires the combination of four agencies, and two agencies want joint powers while two agencies want contract management, this would be a lower ranked system (for this benefit measure) than would be the case if all four agencies favored the same management form.

The last row of Table 6 is provided to average the benefit (not cost) measures and provide an overall ranking of the alternatives. The lowest number corresponds to the best system. It is recognized that some of the benefit measures will be more important to some members than others. These preferences for certain benefit measures should be brought out at the committee meetings and openly discussed.

The 911 committee should then put together a final summary ranking of alternatives using averages of the rankings provided by the individual members. This summary ranking of benefits and the costs of the alternatives should then be discussed by the full committee to select the most cost-effective alternative for the 911 planning area.

In the event that the agencies and jurisdictions are unable to reach agreement on some alternative, the ICC will provide assistance to the 911 committees.

IX PREPARATION OF PRELIMINARY 911 PLANS

After an alternative has been selected, it will be necessary to develop a tentative 911 plan. This plan should include a schedule of implementation and at least the elements outlined below. It must be submitted to the ICC for approval before January 31, 1980. The plans should be on a county by county basis. That is, all plans for a county should be submitted in one package. In this chapter we present "minimal" plan requirements. Each 911 plan should contain a statement dealing with each topic area, since the success of the resultant system can be seriously jeopardized if complete interagency and interjurisdictional understanding is not reached.

A. Configuration of the 911 System

It is most important that the proposed 911 service area be clearly described to all affected agencies prior to any definitive implementation action. Consequently, a list of concerned agencies should be compiled, and a representative of each agency should sign it to demonstrate acceptance. This will prevent situations where one area is blocked in its 911 development because of actions taken by another jurisdiction. Concerned agencies will include:

- All member agencies with their service areas. A member agency is one with the bulk of its 911 calls for that area processed through the system PSAP. These agencies will have to closely cooperate in the 911 center management.
- All marginal agencies should be listed, together with their service areas within the listed exchanges. Marginal agencies are those with most of their service area in another PSAP area. For example, if ten percent of Agency A's service area falls within an exchange wired into a PSAP, this should be described. Call handling for the ten percent of the calls, e.g., call transfer between PSAPs, a special line to the appropriate PSAP, and radio relay of the information, also should be described.
- The affected exchanges should be clearly listed so that there is no doubt about all prefixes accessing this particular answering point (PSAP).

B. Technical/Operational Components

Although the proposed state requirements in this area are fairly extensive, there are some points which should be covered separately in each local public safety answering agreement.

- Call handling by call type for each agency must be specified for each PSAP.
- Call handling procedures for each agency should be specified, along with any hardware requirements. For example, if an agency wishes its calls transferred, the PSAP will need dedicated lines for transfer and call transfer equipment. (To be developed in conjunction with telephone representatives.)
- The interconnection with any additional (i.e., other than law enforcement, fire, or emergency medical) resources should be specified, as should connections to adjoining PSAPs.
- PSAP manning levels and response times should be clearly described and any differences from the recommended state standards (90% of all 911 calls received in the average busiest hour should be answered within three rings/10 seconds) should be described.
- If answering positions are to be equipped with instant playback recorders, this should be specified.
- Any additional technical features, such as alternate telephone cable entrances into PSAPs, underground or buried cable entrance facilities, or alternate power sources for the PSAP, should be specified.

In brief, any technical or operational feature not required by state law should be clearly described in the local 911 plan. This will minimize the possibility of misunderstandings after the system is operational.

C. Management and Staffing

Regardless of the type of management finally decided upon, certain points should be covered in the 911 plan:

- The agency assuming responsibility for provision of 911 answering should be clearly identified, whether it is an existing agency or one formed for this specific purpose.
- Formal appeal procedures should be fully described, and accessible to all user agencies. For example, under a joint powers agreement, users would complain first to a head of the communication center. If they were not satisfied, their complaint would be heard by the user board which would try to arbitrate the dispute informally. Ultimately, such a dispute would be heard by the policy board who would make the final decision. If all local procedures cannot resolve a complaint, the ICC will provide arbitration.
- Formal sanctions should be described. For example, if the provider agency (contract arrangement) refuses arbitration by the user board with regard to level of service or any other predefined factor, the board could allow the complainant to withhold his funding contribution until the situation is judged as rectified by the board. In this case, the provider agency could still be required to provide 911 service. The same sanction could be applied to the joint powers agreement.
- The agreement should specify the number of new personnel to be hired and their positions. It should also discuss any problems caused by changes in status of existing personnel-- for example, the retirement benefits of individuals who had worked for one agency and were transferred to a new status in a PSAP.
- Although the state is developing standards for operator training (Section X), any local additions to these standards should be clearly outlined in the plan.

D. Finance--Initial and Recurring

It is difficult to discuss final system funding at this time because it is not clear whether there will be subvention from the state. If there is subvention, it is not known what level of funding will be provided. However, since Illinois traditionally relies on local resources, it has been assumed that at least some portion of 911 costs will be carried by local governments. Under these conditions, an equitable funding mechanism is a necessary part of any contract or joint powers agreement. Such a funding mechanism could be based on one of the following formulas which can be used to determine both initial and recurring cost:

- Contributions based on the percentage of the total population residing in a specific jurisdiction.
- Contributions based on the ratio between law enforcement budgets for various jurisdictions.
- Contributions based on the percentage of the total emergency calls that a given agency receives in a month. That is, in an area with 100 emergency calls per month, an agency receiving 50 calls would pay 50 percent of the local share.

These are by no means the only way to determine local contributions, but they do show some of the more common methods. Each plan should show one formula, preferably with the formula worked to completion.

X CONTINUING 911 ACTIVITIES

It has already been pointed out that tentative 911 plans must be given to the ICC and local telephone companies on or before January 31, 1980. The ICC will review all plans and return them to local 911 planning committees with a letter of acceptance or rejection within 6 months of receipt. This letter will specify any problems with the plan and give suggestions about solutions to these problems. Once the plan is approved by the ICC, it will be finalized and an order can be placed with the local telephone provider. This interactive process must be completed by January 31, 1982.

Although preparation of the final plan is the last step in local 911 planning, many equally important considerations will arise after an order has been placed. The 911 committee, or appropriate groups which it appoints, should continue to meet and discuss the following topic areas.

1. Staffing of the 911 center will be particularly important since user satisfaction will largely depend upon it. If the area is planning to place its 911 communications in an existing agency, it will probably not hire a manager for 911 communications. Its staffing concerns will center around the need for more people, equitable transfer of communications personnel, and related matters. This situation will generally be the case in more rural areas. In urban areas where participants agreed to develop a new communication service, they will want to consider qualities and training necessary to a successful 911 manager.
2. Training, whether it involves retraining existing personnel or developing a program for new employees, is equally important. The training course must conform to the state program and fill any additional local needs. It is extremely important that these needs be discovered as early as possible to eliminate possible problems later. The state recommended training program is discussed in Reference 1.
3. Advertising the change to 911 and appropriate 911 usage should begin shortly before the official date of change. The actual cutover should postdate the advertising campaign and predate the official date. This gives a

"period of grace" to allow a trial of the system. Enough people will utilize 911 to create an efficient test, but it will not yet be officially liable. Local governments should avoid advance advertising, since citizens generally start to call 911 shortly after the first ads appear. If they call and there is no answer, it can provoke public outcry. Reference 1 provides further information about appropriate, effective 911 advertising.

In conclusion, cooperation is the major ingredient to successful 911 development. Even agreeing to disagree and calling in the ICC is better than not reaching a settlement. Workable 911 systems will emerge if all parties conscientiously follow the steps discussed in this manual.

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Appendix A

HB 911

Clerk of the House

John A. Blain

Originated in the House of Representatives

PUBLIC ACT 79-1092

7/1/79
CAP

1 AN ACT in relation to the designation of an emergency 11
2 telephone number for use throughout the State. 12

3 Be it enacted by the People of the State of Illinois, 14
4 represented in the General Assembly: 15

5 Section 1. The General Assembly finds and declares that 17
6 it is in the public interest to shorten the time required for 18
7 a citizen to request and receive emergency aid. There
8 currently exist thousands of different emergency phone 19
9 numbers throughout the state, and present telephone exchange 20
10 boundaries and central office service areas do not 21
11 necessarily correspond to public safety and political
12 boundaries. Provision of a single, primary three-digit 22
13 emergency number through which emergency services can be 23
14 quickly and efficiently obtained would provide a significant
15 contribution to law enforcement and other public service 24
16 efforts by making it less difficult to quickly notify public 25
17 safety personnel. Such a simplified means of procuring 26
18 emergency services will result in the saving of life, a
19 reduction in the destruction of property, quicker 27
20 apprehension of criminals, and ultimately the saving of 28
21 money. The General Assembly further finds and declares that
22 the establishment of a uniform, statewide emergency number is 29
23 a matter of statewide concern and interest to all inhabitants 30
24 and citizens of this State. It is the purpose of this Act to 31
25 establish the number "911" as the primary emergency telephone 32
26 number for use in this State and to encourage units of local
27 government and combinations of such units to develop and 33
28 improve emergency communication procedures and facilities in 34
29 such a manner as to be able to quickly respond to any person 35
30 calling the telephone number "911" seeking police, fire,
31 medical, rescue, and other emergency services. 36

32 Section 2. As used in this Act, the terms defined in 38
33 Sections 2.01 through 2.09 have the meanings ascribed to them 39

1 in those Sections. 39

2 Section 2.01. "Public agency" means the State, and any 41

3 unit of local government or special purpose district located 42

4 in whole or in part within this State which provides or has

5 authority to provide firefighting, police, ambulance, 43

6 medical, or other emergency services.

7 Section 2.02. "Public safety agency" means a functional 45

8 division of a public agency which provides firefighting, 46

9 police, medical, or other emergency services.

10 Section 2.03. "Direct dispatch method" means a telephone 48

11 service providing for the dispatch of an appropriate 49

12 emergency service unit upon receipt of a telephone request 50

13 for such services and a decision as to the proper action to 51

14 be taken.

15 Section 2.04. "Relay method" means a telephone service 53

16 whereby pertinent information is noted by the recipient of a 54

17 telephone request for emergency services, and is relayed to 55

18 appropriate public safety agencies or other providers of 56

19 emergency services for dispatch of an emergency service unit.

20 Section 2.05. "Transfer method" means a telephone 58

21 service which receives telephone requests for emergency 59

22 services and directly transfers such requests to an 60

23 appropriate public safety agency or other provider of

24 emergency services.

25 Section 2.06. "Referral method" means a telephone 62

26 service which, upon the receipt of a telephone request for 63

27 emergency services, provides the requesting party with the 64

28 telephone number of the appropriate public safety agency or 65

29 other provider of emergency services.

30 Section 2.07. "Basic system" means a telephone service 67

31 which automatically connects a person dialing the digits 68

32 "911" to an established public safety answering point through 69

33 normal telephone service facilities.

34 Section 2.08. "Sophisticated system" means a basic 71

35 system with the additional capability of automatic 72

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1 identification of the caller's number, holding the incoming 73
2 call, reconnection on the same telephone line, clearing a
3 telephone line, or automatic call routing or combinations of 74
4 such capabilities.

5 Section 2.09. "Commission" means the Illinois Commerce 76
6 Commission.

7 Section 3. Every local public agency, within its 78
8 respective jurisdiction, shall establish and have in 79
9 operation by December 31, 1985, a basic or sophisticated
10 system as specified in this Act.

11 The establishment of such systems shall be centralized to 91
12 the extent feasible. Nothing in this Act shall be construed 92
13 to prohibit or discourage in any way the formation of
14 multijurisdictional or regional systems, and any system 93
15 established pursuant to this Act may include the territory of 94
16 more than one public agency or may include a segment of the
17 territory of a public agency.

18 Section 4. Every system shall include police, 96
19 firefighting, and emergency medical and ambulance services, 97
20 and may include other emergency services, in the discretion
21 of the affected local public agency, such as poison control 98
22 services, suicide prevention services, and civil defense 99
23 services. The system may incorporate private ambulance 99
24 service. In those areas in which a public safety agency of
25 the state provides such emergency services, the system shall 91
26 include such public safety agencies.

27 Section 5. The digits "911" shall be the primary 92
28 emergency telephone number within the system, but a public 94
29 agency or public safety agency may maintain a separate
30 secondary backup number, and shall maintain a separate number 95
31 for nonemergency telephone calls.

32 Section 6. All systems shall be designed to meet the 97
33 specific requirements of each community and public agency 98
34 served by the system. Every system, whether basic or 99
35 sophisticated, shall be designed to have the capability of

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1 utilizing at least 1 of the methods specified in Sections 100
2 2.03 through 2.06, in response to emergency calls. The 101
3 General Assembly finds and declares that the most critical
4 aspect of the design of any system is the procedure 102
5 established for handling a telephone request for emergency 103
6 services.

7 In addition, to maximize efficiency and utilization of 105
8 the system, all pay telephones within each system shall, by 106
9 December 31, 1985, enable a caller to dial "911" for 107
10 emergency services without the necessity of inserting a coin.

11 Section 7. The General Assembly finds that, because of 109
12 overlapping jurisdiction of public agencies, public safety 110
13 agencies and telephone service areas, the Commission shall 111
14 establish a general overview or plan to effectuate the 112
15 purposes of this Act within the time frame provided in this 113
16 Act. In order to insure that proper preparation and 114
17 implementation of emergency telephone systems are
18 accomplished by all public agencies by December 31, 1985, the 115
19 Commission, with the advice and assistance of the Attorney 116
20 General, shall secure compliance by public agencies as
21 provided in this Act.

22 Section 8. The Commission, with the advice and 118
23 assistance of the Attorney General, shall coordinate the 119
24 implementation of systems established under this Act. The
25 Commission, with the advice and assistance of the Attorney 120
26 General, shall assist local public agencies and local public 121
27 safety agencies in obtaining financial help to establish
28 emergency telephone service, and shall aid such agencies in 122
29 the formulation of concepts, methods, and procedures which 123
30 will improve the operation of systems required by this Act
31 and which will increase cooperation between public safety 124
32 agencies.

33 Section 9. To accomplish the responsibilities specified 126
34 in this Act, the Commission is directed to consult at regular 127
35 intervals with the State Fire Marshal, the Department of 128

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1 Public Health, the Department of Transportation, the public 128
2 utilities in this State providing telephone service, the 129
3 Department of Law Enforcement, and the State Division of 130
4 Forestry. Such agencies shall provide all necessary
5 assistance and consultation to the Commission to enable it to 131
6 perform its duties specified in this Act.

7 Section 10. Technical and operational standards for the 133
8 development of the local agency systems shall be established 134
9 and reviewed by the Commission on or before December 31, 135
10 1979, after consultation with all agencies specified in
11 Section 9.

12 Section 11. On or before January 31, 1980, all public 137
13 agencies shall submit tentative plans of the establishment of 138
14 a system required by this Act to the public utility or 139
15 utilities providing public telephone service within the
16 respective jurisdiction of each public agency. A copy of 140
17 each such plan shall be filed with the Commission.

18 On or before January 31, 1982, all public agencies shall 142
19 submit final plans for the establishment of the system to 143
20 such utilities, and shall make arrangements with such 144
21 utilities for the implementation of the planned emergency
22 telephone system no later than December 31, 1985. A copy of 145
23 the plan required by this subdivision shall be filed with the 146
24 Commission. In order to secure compliance with the standards 147
25 promulgated under Section 10, the Commission shall have the 148
26 power to approve or disapprove such plan, unless such plan 149
27 was announced before the effective date of this Act. 150

28 If any public agency has implemented or is a part of a 152
29 system required by this Act on a deadline specified in this 153
30 Section, such public agency shall submit in lieu of the 154
31 tentative or final plan a report describing the system and 155
32 stating its operational date.

33 Plans filed under this Section shall conform to minimum 157
34 standards established pursuant to Section 10. 158

35 Section 12. The Attorney General may, in behalf of the 160

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1 Commission or on his own initiative, commence judicial 161
2 proceedings to enforce compliance by any public agency or 162
3 public utility providing telephone service with this Act.

4 Section 13. On or before February 16, 1979, and again on 164
5 or before February 16, 1981, the Commission shall report to 165
6 the General Assembly the progress in the implementation of
7 systems required by this Act. Such reports shall contain his 166
8 recommendations for additional legislation. 167

9 In December of 1979 and in December of 1980 the 169
10 Commission, with the advice and assistance of the Attorney 170
11 General, shall submit recommendations to the Bureau of the 171
12 Budget and to the Governor specifying amounts necessary to 172
13 further implement the organization of telephone systems
14 specified in this Act during the succeeding fiscal year. The 173
15 report specified in this paragraph shall contain, in 174
16 addition, an estimate of the fiscal impact to local public 175
17 agencies which will be caused by implementation of this Act.

18 By March 1 in 1979 and every even-numbered year 177
19 thereafter, each telephone company shall file a report with 178
20 the Commission and the General Assembly specifying, in such 179
21 detail as the Commission has by rule or regulation required,
22 the extent to which it has implemented a planned emergency 180
23 telephone system and its projected further implementation of 181
24 such a system.

25 Section 14. The General Assembly declares that a major 183
26 purpose in enacting this Act is to eliminate instances in 184
27 which a responding emergency service refuses to render aid to
28 the requester because the requester is outside of the 185
29 jurisdictional boundaries of the emergency service. 186
30 Therefore, in implementing systems under this Act, all public 187
31 agencies in a single system shall annually enter into a joint
32 powers agreement or any other form of written cooperative 188
33 agreement which is applicable when need arises on a 189
34 day-to-day basis. In addition, such agreements shall be
35 entered into between public agencies and public safety 190

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1 agencies which are part of different systems but whose 191
 2 jurisdictional boundaries are contiguous. The agreements 192
 3 shall provide that, once an emergency unit is dispatched in
 4 response to a request through the system, such unit shall 193
 5 render its services to the requesting party without regard to 194
 6 whether the unit is operating outside its normal 195
 7 jurisdictional boundaries.

8 Section 15. Copies of the annual agreement required by 197
 9 Section 14 shall be filed with the Attorney General and the 198
 10 Commission. Commencing with the year 1987, all such
 11 agreements shall be so filed prior to the 31st day of 199
 12 January. The Attorney General shall commence judicial 200
 13 proceedings to enforce compliance with this Section and
 14 Section 14, where a public agency or public safety agency has 201
 15 failed to timely enter into such agreement or file copies
 16 thereof.

17 Section 16. This Act takes effect July 1, 1975. 203

William C. Redmond
 Speaker, House of Representatives
Ed Hartee
 President of the Senate

APPROVED

this 25th day of September 1975 A.D.

James A. Thompson
 GOVERNOR



Appendix B

ALTERNATIVE 911 SYSTEM CONFIGURATIONS AND COSTS

Appendix B

ALTERNATIVE 911 SYSTEM CONFIGURATIONS AND COSTS

There were five primary reasons for formulating alternative 911 systems: (1) to provide informative examples; (2) to show the effects of different combinations of system elements; (3) to provide a framework for information feedback; (4) to form a basis for making a choice, and; (5) to assist the state in determining overall requirements for technical, operational, management, and fiscal policy.

This appendix describes: The methodology that was employed to derive alternative 911 systems for Illinois; the alternatives themselves; the estimated cost of each alternative; and, a discussion of several optional 911 telephone service features.

A. Methodology for Configuring 911 System Alternatives

Configuration of alternative 911 systems for the State involved an analysis of the following factors:

- Telephone plant equipment boundaries
- Jurisdictional entities
- Recommendations of previous consultants
- Discussions with local government and public safety personnel
- Examination of existing Illinois 911 systems.

Three general system configurations were considered for most of the state: single county systems, subcounty systems, and multicounty systems. A different approach, including selective call routing, was used for Cook County.

1. General System Configurations

The single county 911 alternatives basically assume that each county will be served by its own Public Safety Answering Point (PSAP). For the purposes of estimating system size and cost, the PSAP has been assumed to be located at the communications center of the police department of the largest city in the county, or at the communications center of the sheriff's department (depending on which department is dispatching for the largest population).

The subcounty alternatives assume that some counties will be served by two or more 911 systems. It has been assumed that each city having a population of 5,000 or more may be served by its own 911 system and PSAP, with the remainder of the county being served by another 911 system and PSAP (as described in the preceding paragraph). Where more than one city of 5,000 or greater share common telephone boundaries, the cities were grouped in a metropolitan system with the PSAP located in the largest city (unless previous studies indicated otherwise).

The multicounty alternatives assume that some 911 systems will serve two or more counties. These alternatives were configured in two different ways. In one set of multicounty alternatives, we combined adjacent counties that each have a population less than 20,000 and have no cities with a population in excess of 5,000. In these instances, the PSAPs are assumed to be located at the police department or sheriff's department that serves the largest population. The second set of multicounty alternatives was suggested by the Illinois State Police (ISP). The PSAPs for these alternatives are assumed to be located at the ISP district dispatch centers serving these alternatives. The ISP alternatives represent the broadest (not all or nothing) involvement in 911 systems that are perceived as feasible for each headquarters facility. The formulation and selection of alternatives process (Chapters VI and VIII) at the local level may produce variations in these alternatives.

2. Specific Considerations

The use of particular information derived from examination of the operations and political structures within Illinois (that existed during the time of the preparation of this manual) are described in the following paragraphs.

a. Telephone Plant Equipment Boundaries

In each of the three types of system configurations--county, subcounty, and multicounty--the boundaries established by the telephone central office service areas were analyzed to establish common PSAP service areas. In cases where telephone central office boundaries were contained totally within a jurisdictional boundary, the selection of the serving PSAP was straightforward. In cases where the central office boundaries overlapped two or more jurisdictions (incorporated and unincorporated areas on county lines, for example), the central office was assigned to the PSAP corresponding to the area with the greatest law enforcement jurisdictional population.

b. Jurisdictional Entities

Within each jurisdiction there are several public safety entities to be incorporated into the 911 system. For example, city police and fire departments are often independently dispatched, unincorporated areas lying within a common central office boundary or PSAP service area can include several fire districts, and definitive service boundaries are nearly non-existent or ill defined for many of the privately owned emergency medical services. For the conceptual design of alternative 911 systems, the PSAP service areas have been based on current law enforcement jurisdictional boundaries. A consequence of this approach is that a given radio dispatch center can receive emergency information from more than one PSAP if its service area overlaps more than one PSAP area.

c. Recommendations of Consultants

A number of studies and designs of 911 and public safety communications systems have previously been performed for selected areas in Illinois. The majority of these studies have suggested county-wide dispatch consolidations while some have suggested multicounty dispatch systems. A few of these studies include subcounty or metropolitan systems. The combinations of cities and counties involved in these studies were used to determine some alternative PSAP service areas.

d. Discussions with Local Personnel

Many discussions were held with local government and public safety officials. These discussions provided additional insight into local groupings of public safety agencies to be served by PSAPs.

e. Examination of Existing 911 Systems

The 911 systems existing in Illinois during the preparation of this manual were examined. These 911 systems were treated as individual subcounty alternatives and incorporated into their respective area alternatives.

B. 911 System Requirements and Costs

A basic 911 system is composed of the following primary elements:

- Incoming 911 trunks to the PSAP
- Outgoing transfer lines from the PSAP
- Call answering and transfer equipment
- Call recording equipment
- 911 call answerers.

This section describes the procedures for determining the size and costs of those elements. Since the specific local data needed to fully describe these elements were not available, this section also presents assumptions that were used to size and cost the local system alternatives.

1. Incoming 911 Trunks

The incoming 911 trunks are the telephone lines over which 911 calls are routed from the telephone company central office(s) to the Public Safety Answering Point (PSAP). These incoming trunks can be provided by using either tandem (network switched) or direct (private line) trunking. In tandem trunking, all 911 calls are routed by whatever means the telephone company chooses, and with as many lines as it takes to meet the state standards, from each telephone central office (CO) in the 911 system to the PSAP's serving CO. The PSAP then leases the necessary number of lines between its serving CO and the PSAP. In direct trunking, the PSAP leases a sufficient number of private lines--between each CO in the PSAP's service area and the PSAP--to handle the estimated number of busy-hour 911 calls.

Direct trunking is more expensive than tandem trunking when the 911 system is comprised of more than one telephone CO. This is because direct trunking requires more telephone lines than does tandem trunking, and because different telephone service tariffs are applied to the two methods. In a large system, direct trunked 911 lines can cost four or five times as much as tandem trunked lines.

When making a decision on whether to implement direct or tandem trunking, cost is not, of course, the only factor to consider. The following factors should also be considered:

- Direct trunking is a prerequisite for certain optional telephone service features that are discussed in Section D of this appendix.
- When a 911 system is comprised of two or more COs, direct trunked lines may be hardwired through all intermediate COs. This increases system survivability in case one of the intermediate COs suffers a power failure or some minor damage.
- Direct trunking is required for selective call routing.
- The telephone network is normally heavily loaded at certain times of the year such as Mother's Day, Christmas, etc. When these heavy telephone traffic load periods occur, a direct trunked system would be affected less than a tandem trunked system.

In the local alternatives presented in this manual, direct trunking of the incoming 911 lines has been assumed. This assumption was made at the direction of the statewide 911 policy committee.

a. Number of Trunks Required

To calculate the required number of telephone lines needed to handle traffic between two locations, values must be obtained or assumed for the four following parameters: grade of service, ring-down time, average busiest hour call volume, and average call length.

Grade of service is the probability of a call being blocked by busy trunks. The proposed standards require a grade of service of at least P.01 (no more than one busy in 100 attempts in the average busiest hour).

Ringdown time is the length of time that a phone rings before it is answered. There is presently no mandatory standard proposed for this parameter. A 10 second (two or three rings) ring-down time has been specified as a desirable feature and has been assumed in calculating the number of required 911 trunks shown in the alternatives presented in this manual.

Call volume refers to the number of calls that must be handled during the average busiest hour. As pointed out earlier in this manual (Section IV-C), the number of calls handled by each agency must be determined by the local 911 Committee. In the alternatives presented in this manual, it has been assumed that a 911 system will receive 0.28 calls in its average busiest hour for each 1,000 population that is served by the system. This factor of 0.28 is obtained by assuming that there will be two emergency calls per 1,000 population on an average day, that a busy day is about 40 percent busier than an average day, and that 10 percent of a day's call volume occurs during the average busiest hour of the day (2 times 1.4 times 0.1 equals 0.28).

The average call length will have to be determined by the local 911 Committees. In computing the 911 trunk requirements shown in the following alternatives, the average call length has been assumed to be 60 seconds (an average value confirmed by several operating 911 systems).

The telephone company representative(s) on the local 911 Committee will be able to supply the necessary expertise in using these four parameters to compute the number of required 911 trunks.

Bear in mind that there is a proposed mandatory state standard that requires (if direct trunking is used) at least two 911 lines between the PSAP and each central office in its service area.

b. Cost of Trunks

The telephone service charges that have been used for estimating the telephone system costs given in this manual are approximations based on 1976 tariffs. The costs, although not exact, are sufficient for planning purposes. Exact charges can be obtained from the telephone company representative(s) on the local 911 Committees.

The costing rates that have been used to estimate the initial (one-time nonrecurring) costs and the monthly (recurring) costs of the incoming 911 trunks are shown in Table B-1.

Table B-1

APPROXIMATE 911 TRUNK RATES^{*}

Type of Trunk	Initial Cost	Monthly Cost
Intraexchange	\$35 per trunk	\$20 per trunk
Interexchange	\$45 per trunk	\$5 per mile per trunk plus \$25 per trunk as a local loop charge

When the PSAP is within the service area of the central office that is being tied to it, the intraexchange rates given in Table B-1 were used to estimate costs. All other central offices being tied to the PSAP were priced using the interexchange rates. All distance measurements being made between central offices were rounded up to the nearest whole mile. The local loop charge added to the interexchange trunks accounts for the lines, and their termination charges, between the PSAP and its serving central office.

* These rates are based on the terms of tariffs in effect as of May 1976. These tariff rates are subject to change.

2. Outgoing Transfer Lines

Outgoing private lines from the PSAP are sometimes necessary so that the 911 call answerers can transfer callers reporting an emergency (or relay the required information) to the radio dispatch center that is responsible for sending the necessary assistance. Transfer lines should also be used to connect a PSAP with one or more adjacent PSAPs.

a. Number of Lines Required

The number of required transfer lines is computed in the same manner as the number of incoming 911 trunks (discussed in Section B-1-a of this appendix). Since the necessary detailed information concerning the names, service areas, dispatch center locations, and traffic loads of all public safety agencies in Illinois was not determined as part of this study, certain assumptions have been made to estimate the number and cost of the transfer lines associated with each local alternative 911 system's PSAP.

The number of agencies assumed to be connected to each alternative PSAP by transfer lines was estimated by using the following publications and information:

- The Police Officer's Handbook of Laws and Directory of Law Enforcement Agencies published by the Illinois Police Association and the Illinois Association of Chiefs of Police
- A map showing the boundaries and dispatch center locations of the Illinois State Police districts
- The Fire Services Directory published by the State of Illinois, Department of Law Enforcement, Division of Fire Prevention
- Maps supplied by the State of Illinois, Department of Local Government Affairs, Office of Financial Affairs which show the approximate boundaries of fire protection districts.
- A list of ambulance companies supplied by the Illinois Department of Public Health, Division of Emergency Medical Services and Highway Safety.

It was assumed that each public agency, except volunteer fire agencies, would be connected to its PSAP by one transfer line. These volunteer departments would probably be notified by radio paging, by the regular telephone network, by the sounding of a siren, or by some other such means.

b. Cost of Lines

The estimated transfer line costs were developed using the approximate rates presented previously in Table B-1. Since the locations of all public safety agencies were not known, estimates of line mileage were made. The same distance was assumed for each transfer line in any given alternative. The distance that was assumed for each alternative is equal to approximately one-third of the system's longest dimension.

The telephone company representatives on the local 911 Committees will be able to supply assistance in determining the costs of the transfer lines.

3. Call Answering and Transfer Equipment

The telephone companies in Illinois have a number of different types and sizes of call answering and transfer equipment that are available for use in 911 systems. The telephone company representative(s) on the 911 Committee can provide complete details on the available equipment and its applicability to any given 911 system.

a. Number of Equipments Required

The number of pieces of call answering and transfer equipment that will be needed is dependent upon the number of call answering positions that must be manned during the average busiest hour. Since each call answerer must have access to all incoming and outgoing emergency lines, there must be at least one piece of equipment for each call answerer that is on duty during the shift that has the average busiest hour.

b. Cost of Equipment

To simplify the process of estimating the costs of the alternative 911 systems presented in this manual, it was assumed that PBX-type equipment will be used to answer and transfer 911 calls. The costs shown in Table B-2 are the approximate rates that were used. The actual costs will vary among the telephone companies.

Table B-2

APPROXIMATE CALL ANSWERING EQUIPMENT COSTS

No. of Busy Hour Answerer Positions	Cost per Position		Cost per 911 Line	
	Initial	Monthly	Initial	Monthly
1, 2, or 3	\$150	\$100	\$35	\$25
4 or 5	300	170	35	25

The use of PBX terminal equipment is not necessarily being recommended; it was used so that a "ballpark" call answering and transfer equipment cost could be determined. Local needs will determine the type of equipment to be used.

4. Call Recording Equipment

There is a proposed mandatory state operational standard that requires the use of a master logging recorder to record both sides of the conversation and the date and time of receipt of each 911 call. Two different methods of configuring logging recorders were discussed in Section VI-D. The estimated costs of these recorders are presented in Table 4 of Section VI-D.

In addition to the master logging recorder, some PSAPs may wish that each 911 call answering position have an endless loop or cassette type of recorder. This recorder automatically records every emergency call and provides the answerers with an immediately accessible record of the call (without interrupting the master logging recorder) if the information must be repeated or reconfirmed and the calling citizen is no longer available to provide it. The estimated cost for each of these individual position recorders (based on manufacturers literature) is about \$900 to \$1,000.

5. 911 Call Answerers

A major factor in sizing a 911 system is the number of call answering positions required. Final determination of the answering and dispatch position requirements for each PSAP must be made on a case-by-case basis using local operational data for the proposed system. In this section, guidelines that will be useful in determining the number of answering and dispatch positions are provided.

a. Number of Personnel Needed in Busiest Hour (B.H.)

The estimated workloads used to derive the guidelines for call answerer and dispatcher requirements were based on previous observations and measurements of public safety communication systems performed by SRI. The principal work elements and estimates are as follows:

- 911 call length with direct dispatch, call relay, or call referral is 60 seconds.
- 911 call length with call transfer is 25 seconds.
- 65 percent of all 911 calls result in a dispatch (remaining 35 percent of the calls are processed administratively).
- Each dispatch requires 15 radio messages (some of these messages are routine or supervisory, but this ratio of messages to dispatched incidents is fairly constant).
- Call answerers and radio dispatchers are 75 percent efficient.
- The call answerers and/or dispatchers will answer 90 percent of all incoming 911 calls and/or complete the resulting radio transmissions within 10 seconds.

Table B-3 shows the daily number of 911 calls which can be handled by a single stage system (same individual performing both 911 call answering and radio dispatching) for varying numbers of call answerer/dispatcher positions and varying percentages of calls transferred from these positions to other dispatch centers. For example, a rural area center (receiving approximately one emergency call per 1000 citizens per day) could efficiently serve approximately 18,000 citizens with one position (one person on duty) answering and dispatching all emergency calls.

For an existing single stage operation to serve as a 911 center to direct dispatch its own calls, and to transfer the calls of other agencies, the total number of calls which can be handled increases, but the number of calls which can be handled by direct dispatch is reduced. For example, one single-stage answering/dispatch position can serve up to 33,000 rural citizens if 50 percent of the calls

Table B-3

SINGLE STAGE CALL ANSWERER/DISPATCHER
POSITION REQUIREMENTS

Answerer/ Dispatcher Positions	100% Direct Dispatch			75% Direct Dispatch 25% Call Transfer		
	No. of 911 Calls per Day	Population (000)*		No. of 911 Calls per Day	Population (000)*	
		Urban	Rural		Urban	Rural
1	0-18	0-9	0-18	0-24	0-12	0-24
2	18-86	9-43	18-86	25-111	12-56	24-111
3	86-173	43-86	86-173	112-224	56-112	111-224
4	173-269	86-134	173-269	225-348	112-174	224-348

Answerer/ Dispatcher Positions	50% Direct Dispatch 50% Call Transfer			25% Direct Dispatch 75% Call Transfer		
	No. of 911 Calls per Day	Population (000)*		No. of 911 Calls per Day	Population (000)*	
		Urban	Rural		Urban	Rural
1	0-33	0-17	0-33	0-57	0-29	0-57
2	34-157	17-79	33-157	58-268	29-134	57-268
3	158-316	79-158	157-316	269-540	134-270	268-540
4	317-491	158-246	316-491	541-840	270-420	540-840

* The served population figures are based on a daily call rate of two calls per 1000 citizens for urban areas, and one call per 1000 citizens for rural areas.

(calls for a department serving 16,500 citizens) were directly dispatched and the remaining calls were transferred (the calls being for departments serving 16,500 citizens and producing a similar call volume).

A unique circumstance results when a single position is used to directly dispatch 75 percent of the calls and transfer the remaining 25 percent of the calls. In this case, the single position could both dispatch for a department serving 18,000 citizens and assume the additional workload of handling the transferral of calls for a department serving 6,000 citizens. The reason for this apparent increase in workload with no increase in positions is because of the low call volume and the high amount of unused time the answerer/dispatcher must leave available to respond to incoming calls and radio messages. Since the transferable calls are of relatively short duration, they increase the utilization of the position without impacting significantly on its responsiveness.

Table B-4 shows the number of calls and approximate populations which can be served by call answerers and dispatchers working in a two-stage operation (911 call answering and radio dispatching performed by different positions). For example, this table shows that one call answerer can answer an average of 39 daily 911 calls and provide the specified level of service in a rural area. One dispatcher can dispatch for the incidents resulting from 30 911 calls (this translates to approximately 20 incidents, since only an estimated 65 percent of the 911 calls result in a dispatch). Thus, if an agency were currently receiving 30 daily 911 calls, two single-stage answerers/dispatchers would be required (see Table B-3), or one call answerer and one dispatcher would be required for a two-stage operation. The two-stage operation would also permit the call answerer an average of nine additional 911 calls for another agency.

When the previously discussed two tables (Tables B-3 and B-4) are used by a local 911 Committee to estimate personnel requirements, the columns titled "No. of 911 Calls per Day" should be used instead of the columns titled "Population." A local estimate of call volume will be more accurate than an estimate based on the size of the served population. To estimate the number of call answering personnel for the alternative systems presented in this manual, however, it was necessary to use the "Population" columns because detailed information concerning local agency emergency call volumes is generally unknown.

Table B-4

TWO STAGE CALL ANSWERER AND DISPATCHER
POSITION REQUIREMENTS

Call Answering				Radio Dispatching			
Answering Positions	No. of 911 Calls per Day	Population (000) *		Dispatch Positions	No. of 911 Calls per Day	Population (000) *	
		Urban	Rural			Urban	Rural
1	0-39	0-20	0-39	1	0-30	0-15	0-30
2	40-191	20-96	39-191	2	31-139	15-70	30-139
3	192-395	96-198	191-395	3	140-275	70-138	139-275
4	396-626	198-313	395-626	4	276-423	138-211	275-423

* The served population figures are based on a daily call rate of two calls per 1000 citizens for urban areas, and one call per 1000 citizens for rural areas.

To estimate the number of call answerers needed in the busiest hour and the number of additional call answerers that may have to be hired, the following two basic assumptions were made: the law enforcement agency that will house the PSAP currently has a sufficient number of call answerer/dispatchers to handle its current radio and emergency telephone traffic load under normal circumstances; and the PSAP will function as a single-stage system.

The number of 911 call answerers/dispatchers needed in the busiest hour was estimated in the following manner. The population to be served by the 911 system was classified as either urban or rural, an estimate was made as to the percentage that would be handled by direct dispatch (75%, 50%, or 25%), and the population size to be served by the system was estimated. This point was located on Table B-3 and the appropriate number of answerer/dispatcher positions was taken from the first column.

The classification of urban versus rural was made in the following way. Classified as urban were: all single county systems serving more than 50,000 population; all single county systems in which more than half the system population was made up of cities that each had 5,000 or more population; and those subcounty systems other than those which are called "Remainder of County" ("Remainder of County" systems have no cities with populations of 5,000 or more). Classified as rural were: all single county systems that did not meet the criteria for urban; those subcounty systems called "Remainder of County"; and all multi-county systems.

The percentage of calls handled by direct dispatch and the total system population were estimated using the Federal 1970 census data for Illinois. The ratio of the population served by the agency acting as the PSAP to the total population served by the 911 system was used to make the closest fit estimate (75%, 50%, or 25%).

The number of additional positions needed (in some cases) to answer calls at the PSAP because of the added requirement of 911, was estimated in the following manner. The current number of answerer/dispatcher positions needed (before 911 is implemented) to serve the agency assumed to be the PSAP was estimated using the 100% direct dispatch column of Table B-3. This number of positions was then compared to the number that would be needed after 911 is implemented using the added call transfer burden (discussed in the preceding

paragraphs). If the pre-911 and the post-911 personnel requirements were the same, then no additional positions or staff was needed. If, however, more busiest hour answerer/dispatchers are needed after implementation of 911 than before, then additional positions and staff were needed.

The local 911 Committees must determine--using their more accurate call count information -- whether additional staff is needed for one, two, or three shifts. The following information has been assumed to convert the number of additional positions required to the number of additional staff needed:

<u>Number of Additional Positions to Be Manned</u>	<u>Number of Additional Staff Needed</u>
1	3
2	7
3	11
4	15

The determination of the requirements for additional personnel is important because this can be the single highest cost item of a total 911 system. Consequently, the local 911 committees should make every effort to accurately determine their actual personnel needs.

b. Cost of Additional Staff

Local salary levels for answerers/dispatchers vary throughout Illinois. In order to make estimates of the cost associated with the necessity of additional staff, the following monthly salaries were assumed: \$800 per month per additional staff member for all counties except Cook, Du Page and Lake; \$1,000 per month in Cook, Du Page and Lake counties.

C. Local 911 System Alternatives and Costs *

In this section, descriptions of some alternative local 911 systems are presented, together with their estimated costs. The primary purpose of this information is to assist the 911 Committee in evaluating alternative

* All tables and figures referred to in this section are at the end of this section.

911 configurations. The methodology and assumptions that were used to develop these alternatives were presented in the first two sections of this appendix. Guidelines to be used in evaluating the alternatives presented in this appendix are presented in Section VI of the manual.

1. Single County 911 Systems

Single county alternatives have been configured for all counties with the exception of Cook, Du Page, Kane, and Lake counties. Single county systems were not configured for these four counties primarily because each of these counties has a large number of contiguous urban areas, and various consultants working on communications studies in these four counties have not recommended single county systems.

The primary 911 system elements (and their estimated costs) for the 98 single county alternatives are given in Table B-5. Included in this table are the estimates of the number and cost of: incoming 911 trunks, outgoing transfer lines, call answering and transfer equipment, 911 call answerers, and logging recorders. The total estimated initial, monthly, and annual costs are also given.

Maps showing the outlines of the single county alternatives are provided in Figures B-1, B-2, B-3, and B-4. The 911 system boundaries shown on these maps correspond approximately to the exterior boundary formed by the combined telephone central office service areas that make up each 911 system area. To make the presentation of mapped information easier to handle, the state has been divided into four sectional maps titled Northern Illinois, North-Central Illinois, South-Central Illinois, and Southern Illinois.

2. Subcounty 911 Systems

Subcounty alternatives were not configured for all counties because of their lack of cities over 5,000 population. Some counties contain more than one set of subcounty alternatives because of their many urban areas. The subcounty alternatives for Cook, Du Page, and Lake counties--because of their complexity--are presented separately in Section C-4.

The primary 911 system elements (and their estimated costs) for 182 subcounty alternatives in 70 counties are presented in Table B-6. Counties in the table with no associated information are those for which no subcounty alternatives were configured.

Figures B-5, B-6, B-7, B-8, B-9, B-10, and B-11 are maps which show the outlines of subcounty 911 systems. The alternative system boundaries shown on these maps correspond approximately to the exterior boundary formed by the included telephone central office service area(s).

3. Multicounty 911 Systems

There are two sets of multicounty alternatives: 15 that were configured according to the methodology discussed in Section A of this appendix, and the maximum commitment of 15 by the Illinois State Police (ISP)*. The primary 911 system elements (and their estimated costs) for the 30 multicounty alternatives are given in Table B-7.

Figures B-9, B-10, B-11, B-12, B-13, and B-14 are maps which show the outlines of the 15 multicounty 911 systems that were developed using the methodology of Section A. The system boundaries shown on these maps correspond approximately to the exterior boundary formed by the combination of telephone central office service areas that make up each multicounty system area. The multicounty system alternatives suggested by the ISP were not outlined on maps.

4. Northeastern Illinois 911 Systems

Because of the population density, numbers of contiguous city boundaries, and recommendations from consulting studies in the northeastern portion of the state (Cook, Du Page, and Lake counties), it was necessary to investigate alternative 911 systems for this area in greater depth. Division of all three counties by telephone company central office boundaries was investigated for the three counties. Also investigated were two methods of implementing selective call routing for Cook County (excluding the City of Chicago).

a. Division by Telephone Central Office Boundaries

The subcounty alternatives for Du Page and Lake counties are shown in Figure B-15. The subcounty alternatives (using telephone central office boundaries) for Cook County are shown in Figure B-16. The primary 911 system elements (and their estimated costs) for the 22 subcounty alternative systems to serve these three counties are given in Table B-8.

*The ISP will be willing of course to work with any jurisdiction or agency in establishing a PSAP at an ISP location.

The determination of the areas to be served by each Public Safety Answering Point (PSAP) in Cook County was based primarily on minimizing the mismatch between PSAP service areas and political boundaries. Additionally, none of the existing 911 systems in Brookfield, Evanston, Glencoe, Oak Park, and Tinley Park were modified.

The division of Du Page and Lake counties was based mainly on previous consultants' studies.

b. Cook County Selectively Routed by Radio District

Two alternatives using selective call routing were investigated for Cook County (excluding the City of Chicago). The first alternative is based on the 25 law enforcement radio districts established by a consultant study. The approximate boundaries of the 911 systems comprising this alternative are shown in Figure B-15. Since Arlington Heights, Barrington, and Schaumburg are not currently operating according to the above mentioned study, their PSAP boundaries have been established according to their current operations.

To estimate the costs associated with this alternative it was necessary to first estimate the number of telephone main stations (telephone numbers) that would have to be selectively routed. This was accomplished by first determining which central offices would be involved in an overlap situation, and then estimating the number of main stations that are served by each of these offices. Preliminary analysis indicates that 12 central offices serving approximately 365,000 main stations would be involved in a boundary overlap. This represents about 40 percent of the estimated 900,000 main stations in the county (excluding the City of Chicago).

The cost of selective routing, as pointed out in Section V-D, will vary depending upon the specific network arrangements and the procedures associated with file updating. Using an estimate of \$2 per main station for an installation (initial) cost and 8¢ per main station for a monthly cost, the cost for this alternative would be \$350,400 per year with an initial cost of \$730,000.

The above cost estimate represents essentially the cost of the incoming 911 trunks. It does not include the costs of the outgoing transfer lines, call answering and transfer equipment, call answerers, and logging recorders. Nor does it include a percentage for the telephone companies' return on their investment.

The total estimated costs for this alternative are shown in Table B-9. A detailed breakdown of costs for each 911 system is beyond the scope of this effort.

c. Cook County Selectively Routed by City

The second selective call routing alternative that was investigated for Cook County (excluding the City of Chicago) was selective routing on the basis of city jurisdictional boundaries. The boundaries of these 124 alternative systems (including one PSAP for the sheriff's department to handle the unincorporated areas) were not put on a map.

As stated in the preceding subsection, there are an estimated 900,000 main stations in Cook County (excluding Chicago). Applying the estimates of \$2 per main station installation cost and 8¢ per main station monthly cost to the 900,000 main stations, the cost of this alternative would be \$864,000 per year with an installation cost of \$1,800,000.

The dollar values used to make this estimate, as previously stated, do not include a rate of return on the telephone company investment or the costs of the outgoing transfer lines, call answering and transfer equipment, call answerers, and logging recorders.

It was assumed that additional staff will not be needed and that call transfer capability is not currently available.

The total estimated costs for this alternative are presented in Table B-9. A detailed breakdown of each 911 system's costs is beyond the scope of this effort.

d. Comparison of Three Cook County Alternatives

The estimated costs for three alternative ways of implementing 911 service in Cook County (excluding Chicago) are shown in Table B-9. These three alternatives are not, of course, the only ones open to Cook County. There are an almost uncountable number of possible alternatives. It is possible that some combination of basic 911 and selective routing could be selected for implementation in Cook County.

As indicated in Table B-9, there are significant cost differences among the three alternatives. The initial cost of selective routing by city is almost 13 times as much as the initial cost of basic 911 (division by telephone boundaries)--\$2,397,000 versus \$187,000. The annual cost of these two alternatives differs by a factor of two--\$1,315,000 versus \$649,000.

Selective routing for Cook County is, of course, the most expensive single county system in the state because of the county's extremely large population. Except for Du Page, Kane and Lake counties, however, it is probably the least costly on a per capita basis because of the more advanced telephone central office equipment in the northeast part of the state. The high costs for selective routing, compared to basic 911, indicate that this technique should be used only when inter-jurisdictional agreements on basic 911 are not possible or when inter-agency operations required by basic 911 prove infeasible. An additional factor to consider is the probability that any state financial support (see Financing Section of "Statewide Considerations in Illinois 911 System Development" report) will not cover the extensive additional costs of selective routing.

Table B-5

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SINGLE COUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer Equipment Cost		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Equipment Cost		Number Needed in B.H.	Additional Staff			Initial	Monthly	Annual
		Initial	Monthly		Initial	Monthly	Number Needed	Monthly Cost							
Adams	31	\$1,260	\$3,110	16	\$ 720	\$1,200	\$3,705	\$2,625	3	--	--	\$26,000	\$31,685	\$6,935	\$83,220
Alexander	8	340	700	5	225	300	430	300	1	--	--	9,400	10,395	1,300	15,600
Bond	8	340	510	4	180	220	430	300	1	--	--	9,400	10,350	1,030	12,360
Boone	8	340	440	7	315	408	860	600	2	--	--	9,400	10,915	1,448	17,376
Brown	8	340	320	6	270	360	430	300	1	--	--	9,400	10,440	980	11,760
Bureau	34	1,510	2,820	27	1,215	2,250	2,680	1,900	2	3	\$2,400	26,000	31,405	9,370	112,440
Calhoun	10	430	730	5	225	400	500	350	1	--	--	13,000	14,155	1,480	17,760
Carroll	14	610	950	13	585	845	640	450	1	--	--	13,000	14,835	2,245	26,940
Cass	10	430	850	5	225	333	500	350	1	--	--	13,000	14,155	1,533	18,396
Champaign	53	2,340	4,365	29	1,305	2,320	7,820	5,980	4	--	--	39,000	50,465	12,665	151,980
Christian	18	790	1,310	13	585	975	1,560	1,100	2	--	--	13,000	15,935	3,385	40,620
Clark	12	520	940	8	360	600	570	400	1	--	--	13,000	14,450	1,940	23,280
Clay	14	610	930	5	225	300	640	450	1	--	--	13,000	14,475	1,680	20,160
Clinton	24	1,060	1,790	14	630	1,050	990	700	1	--	--	26,000	28,680	3,540	42,480
Coles	10	430	600	14	630	1,190	1,000	700	2	--	--	13,000	15,060	2,490	29,880
Crawford	14	610	850	7	315	466	640	450	1	--	--	13,000	14,565	1,766	21,192
Cumberland	3	250	310	5	225	316	255	175	1	--	--	4,200	4,930	801	9,612
DeKalb	20	880	1,630	20	900	1,500	1,700	1,200	2	--	--	26,000	29,480	4,330	51,960
Dewitt	10	430	730	8	360	526	500	350	1	--	--	13,000	14,290	1,706	20,472
Douglas	12	520	810	13	585	1,018	570	400	1	--	--	13,000	14,675	2,228	26,736
Edgar	16	700	1,200	14	630	923	710	500	1	--	--	13,000	15,040	2,633	31,596
Edwards	10	430	540	6	270	350	500	350	1	--	--	13,000	14,200	1,270	15,240
Effingham	18	790	1,230	10	450	733	780	550	1	--	--	13,000	15,020	2,513	30,156
Fayette	18	790	1,400	5	225	375	780	550	1	--	--	13,000	14,795	2,325	27,900
Ford	9	790	1,990	11	495	1,008	465	325	1	--	--	9,400	11,150	3,323	39,876

Table B-5 (continued)
LOCAL ALTERNATIVE 911 SYSTEMS COSTS
- SINGLE COUNTY SYSTEMS -

Area	Incoming 911 Trunks		Outgoing Transfer Lines		Call Answering and Transfer Equipment Cost		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost				
	Number	Cost		Number	Cost		Number Needed	Additional Staff			Initial	Monthly	Annual		
		Initial	Monthly		Initial	Monthly		Number Needed	Monthly Cost						
Franklin	16	\$ 700	\$1,050	10	\$ 450	\$ 666	\$1,420	\$1,000	2	3	\$2,400	\$13,000	\$15,570	\$5,116	\$ 61,392
Fulton	32	1,420	3,020	24	1,080	2,320	2,540	1,800	2	3	2,400	26,000	31,040	9,540	114,480
Gallatin	8	340	470	8	360	467	430	300	1	--	--	9,400	10,530	1,237	14,844
Greene	8	700	1,160	7	315	490	430	300	1	--	--	9,400	10,845	1,950	23,400
Grundy	12	520	860	9	405	540	570	400	1	--	--	13,000	14,495	1,800	21,600
Hamilton	14	610	910	5	225	350	640	450	1	--	--	13,000	14,475	1,710	20,520
Hancock	28	1,240	2,230	16	720	1,280	1,130	800	1	--	--	26,000	29,090	4,310	51,720
Hardin	8	340	370	5	225	333	430	300	1	--	--	9,400	10,395	1,003	12,036
Henderson	12	520	960	10	450	600	570	400	1	--	--	13,000	14,540	1,960	23,520
Henry	28	1,240	2,190	25	1,125	1,791	2,260	1,600	2	--	--	26,000	30,625	5,581	66,972
Iroquois	38	1,690	2,390	25	1,125	1,875	1,480	1,050	1	--	--	26,000	30,295	5,315	63,780
Jackson	14	610	960	16	720	1,120	1,280	900	2	--	--	13,000	15,610	2,980	35,760
Jasper	8	340	440	2	90	116	430	300	1	--	--	9,400	10,260	856	10,272
Jefferson	18	790	1,270	9	405	525	2,260	1,100	2	--	--	13,000	16,455	2,895	34,740
Jersey	8	340	470	2	90	123	430	300	1	--	--	9,400	10,260	893	10,716
JoDavless	18	790	1,730	15	675	1,175	780	550	1	--	--	13,000	15,245	3,455	41,460
Johnson	8	340	460	3	135	180	430	300	1	--	--	9,400	10,305	940	11,280
Kankakee	17	735	1,270	30	1,350	2,550	2,235	1,575	3	3	2,400	13,000	17,320	7,795	93,540
Kendall	12	430	700	13	585	693	570	400	1	--	--	13,000	14,585	1,793	21,516
Knox	25	1,095	2,010	22	990	1,540	2,050	1,450	2	--	--	26,000	30,135	5,000	60,000
LaSalle	40	1,780	3,780	32	1,440	3,040	4,650	3,300	3	3	2,400	39,000	46,870	12,520	150,240
Lawrence	14	610	860	6	270	350	640	450	1	--	--	13,000	14,520	1,660	19,920
Lee	22	1,370	2,190	16	720	1,333	1,840	1,300	2	3	2,400	26,000	29,930	7,223	86,676
Livingston	32	1,420	3,090	20	900	1,733	2,540	1,800	2	3	2,400	26,000	30,860	9,023	108,276
Logan	22	970	1,700	18	810	2,000	1,840	1,300	2	--	--	26,000	29,620	5,000	60,000

Table B-5 (continued)
LOCAL ALTERNATIVE 911 SYSTEMS COSTS
- SINGLE COUNTY SYSTEMS -

Area	Incoming 911 Trunks		Outgoing Transfer Lines			Call Answering and Transfer Equipment Cost		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost			
	Number	Cost		Number	Cost		Initial	Monthly	Number Needed	Additional Staff		Initial	Monthly	Annual	
		Initial	Monthly		Number Needed	Monthly Cost									
McDonough	20	\$ 880	\$1,540	15	\$ 675	\$ 975	\$1,700	\$1,200	2	--	--	\$26,000	\$29,255	\$ 3,715	\$ 44,580
McHenry	20	1,240	1,790	32	1,440	2,133	3,390	2,400	3	--	--	26,000	32,070	6,323	75,876
McLean	39	1,725	3,730	31	1,395	2,996	4,545	3,225	3	3	\$2,400	39,000	46,665	12,351	148,212
Macon	23	2,115	3,120	17	765	1,190	4,420	2,980	4	--	--	26,000	33,300	7,290	87,480
Macoupin	36	1,330	2,920	16	720	1,333	2,820	2,000	2	3	2,400	26,000	30,870	8,653	103,836
Madison	38	1,645	2,300	53	2,385	3,975	8,150	5,600	5	7	5,600	26,000	38,180	17,475	209,700
Marion	16	700	955	13	585	975	1,420	1,000	2	--	--	13,000	15,705	2,930	35,160
Marshall	16	700	1,020	8	360	600	710	500	1	--	--	13,000	14,770	2,120	25,440
Mason	18	790	1,670	12	540	900	780	550	1	--	--	13,000	15,110	3,120	37,440
Massac	6	250	270	6	270	410	360	250	1	--	--	9,400	10,280	880	10,560
Menard	10	430	560	7	315	420	500	350	1	--	--	13,000	14,245	1,245	14,940
Mercer	26	1,150	2,090	13	585	1,126	1,060	750	1	--	--	26,000	28,795	3,966	47,592
Monroe	8	340	490	7	315	350	430	300	1	--	--	9,400	10,485	1,140	13,680
Montgomery	22	970	1,670	9	405	675	920	650	1	--	--	26,000	28,295	2,995	35,940
Morgan	18	790	1,370	16	720	1,466	1,560	1,100	2	--	--	13,000	16,070	3,936	47,232
Moultrie	12	230	720	9	405	495	570	400	1	--	--	13,000	14,205	1,615	19,380
Ogle	22	970	1,835	19	855	1,742	1,840	1,300	2	--	--	26,000	30,530	4,877	58,524
Peoria	32	2,230	2,220	22	990	1,833	7,100	4,850	5	3	2,400	26,000	36,320	11,303	135,636
Perry	10	430	580	9	405	600	500	350	1	--	--	13,000	14,335	1,530	18,360
Piatt	16	700	1,220	12	540	900	710	500	1	--	--	13,000	14,950	2,620	31,440
Pike	26	1,150	2,250	14	630	1,283	1,060	750	1	--	--	26,000	28,840	4,283	51,396
Pope	6	250	350	3	135	195	360	250	1	--	--	9,400	10,145	795	9,540
Pulaski	10	430	620	4	180	233	500	350	1	--	--	13,000	14,110	1,203	14,436
Putnam	10	430	550	9	405	480	500	350	1	--	--	13,000	14,335	1,380	16,560
Randolph	24	1,060	2,530	13	585	1,018	990	700	1	--	--	26,000	28,635	4,248	50,976

Table B-5 (concluded)
LOCAL ALTERNATIVE 911 SYSTEMS COSTS
- SINGLE COUNTY SYSTEMS -

Area	Incoming 911 Trunks		Outgoing Transfer Lines		Call Answering and Transfer Equipment Cost		911 Call Answerers/Dispatchers		Logging Recorder Cost	Overall Cost					
	Number	Cost		Number	Cost		Number	Additional Staff		Initial	Monthly	Annual			
		Initial	Monthly		Number Needed	Monthly Cost									
Richland	12	\$ 520	\$ 660	5	\$ 225	\$ 325	\$ 570	\$ 400	1	--	\$13,000	\$14,315	\$ 1,385	\$ 16,620	
Rock Island	22	940	1,515	29	1,305	2,658	4,280	2,880	4	3	\$ 2,400	26,000	32,525	9,453	113,436
St. Clair	34	1,500	2,640	44	1,980	3,300	7,450	5,100	5	11	8,800	26,000	36,930	19,840	238,080
Saline	8	340	420	7	315	420	430	300	1	--	--	9,400	10,485	1,140	13,680
Sangamon	15	1,330	2,500	18	810	1,650	3,300	2,180	4	3	2,400	13,000	18,440	8,730	104,760
Schuyler	8	340	590	9	405	750	430	300	1	--	--	9,400	10,575	1,640	19,680
Scott	6	250	320	4	180	193	360	250	1	--	--	9,400	10,130	763	9,156
Shelby	24	1,060	2,010	13	585	1,083	990	700	1	--	--	26,000	28,635	3,793	45,516
Stark	12	520	660	6	270	320	570	400	1	--	--	13,000	14,360	1,380	16,560
Stephenson	21	915	1,490	16	720	1,013	1,770	1,250	2	--	--	26,000	29,405	3,753	45,036
Tazewell	33	1,455	2,470	34	1,530	2,663	3,915	2,775	3	3	2,400	26,000	32,900	10,308	123,696
Union	6	250	290	8	360	520	360	250	1	--	--	9,400	10,370	1,060	12,720
Vermilion	41	1,905	4,060	24	1,080	2,480	4,755	3,375	3	3	2,400	39,000	46,740	12,315	147,780
Wabash	6	250	300	6	270	360	360	250	1	--	--	9,400	10,280	910	10,920
Warren	14	610	950	7	315	490	1,280	900	2	--	--	13,000	15,205	2,340	28,080
Washington	18	790	1,210	8	360	600	880	550	1	--	--	13,000	15,030	2,360	28,320
Wayne	14	610	1,040	7	315	501	640	450	1	--	--	13,000	14,565	1,991	23,892
White	16	700	1,150	9	405	675	710	500	1	--	--	13,000	14,815	2,325	27,900
Whiteside	21	925	1,695	20	900	1,500	1,770	1,250	2	--	--	26,000	29,595	4,445	53,340
Will	38	1,650	3,120	44	1,980	4,033	8,150	5,600	5	7	5,600	26,000	37,780	18,353	220,236
Williamson	16	700	1,060	17	765	1,020	1,420	1,000	2	--	--	13,000	15,885	3,080	36,960
Winnebago	26	1,110	1,740	26	1,170	1,690	6,050	4,100	5	--	--	26,000	34,330	7,530	90,360
Woodford	12	1,060	1,670	16	720	1,200	570	400	1	--	--	13,000	15,350	3,270	39,240

Table B-6

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering			911 Call Answerers/ Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Equipment Cost		Number Needed in B.H.	Additional Staff Needed	Monthly Cost	Initial		Monthly	Annual	
		Initial	Monthly		Initial	Monthly										
<u>Adams:</u> Quincy Remainder of County	3 28	\$ 105 3,050	\$ 60 750	8 10	\$ 360 450	\$ 373 750	\$ 510 2,260	\$ 350 1,600	2 2	-- --	-- --	\$ 4,200 26,000	\$ 5,175 29,865	\$ 783 5,400	\$ 9,396 64,800	
<u>Alexander:</u> Cairo Remainder of County	2 6	70 270	40 660	5 3	225 135	216 195	220 360	150 250	1 1	-- --	-- --	4,200 9,400	8,915 10,165	406 1,105	4,872 13,260	
<u>Bond</u>																
<u>Boone:</u> Belvidere Remainder of County	2 6	70 270	40 400	5 4	225 180	216 173	440 360	300 250	2 1	-- --	-- --	4,200 9,400	4,935 10,210	556 823	6,672 9,876	
<u>Brown</u>																
<u>Bureau:</u> Princeton Spring Valley Remainder of County	2 2 30	70 70 1,350	40 40 2,590	5 6 16	225 270 720	250 300 1,333	220 220 2,400	150 150 1,700	1 1 2	-- -- --	-- -- --	4,200 4,200 26,000	4,715 4,760 30,470	440 490 5,623	5,280 5,880 67,476	
<u>Calhoun</u>																
<u>Carroll</u>																
<u>Cass:</u> Beardstown Remainder of County	2 8	70 340	40 490	5 3	225 135	225 205	220 430	150 300	1 1	-- --	-- --	4,200 9,400	4,715 10,305	415 995	4,980 11,940	
<u>Champaign:</u> Champaign, Urbana Rentoul Remainder of County	9 2 42	315 70 1,890	180 40 3,900	13 6 16	585 270 720	606 240 1,360	1,395 440 1,620	975 300 1,150	3 2 1	-- -- --	-- -- --	9,400 4,200 39,000	11,695 4,980 43,230	1,761 580 6,410	21,132 6,960 16,920	
<u>Christian:</u> Pana Taylorville Remainder of County	2 2 14	90 70 630	210 40 1,060	4 4 8	180 180 360	140 186 640	220 220 640	150 150 450	1 1 1	-- -- --	-- -- --	4,200 4,200 13,000	4,690 4,670 14,630	500 376 2,150	6,000 4,512 25,800	

Table B-6 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer Equipment Cost			911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Equipment Cost		Number Needed in B.H.	Additional Staff		Initial		Monthly	Annual	
		Initial	Monthly		Initial	Monthly	Initial	Monthly		Number Needed	Monthly Cost					
<u>Clark</u>																
<u>Clay:</u>																
Flora	2	\$ 90	\$ 150	3	\$ 135	\$ 130	\$ 220	\$ 150	1	--	--	\$ 4,645	\$ 430	\$ 5,160		
Remainder of County	12	520	780	4	180	266	570	400	1	--	--	14,270	1,446	17,352		
<u>Clinton</u>																
<u>Coles:</u>																
Charleston	2	70	40	6	270	320	440	300	2	--	--	4,980	660	7,920		
Mattoon	2	70	40	5	225	250	440	300	2	--	--	4,935	590	7,080		
Remainder of County	6	270	480	5	225	250	360	250	1	--	--	10,255	980	11,760		
<u>Crawford:</u>																
Robinson	2	70	40	4	180	166	220	150	1	--	--	4,670	356	4,272		
Remainder of County	12	540	810	5	225	333	570	400	1	--	--	14,335	1,543	18,516		
<u>Cumberland</u>																
<u>De Kalb:</u>																
De Kalb	2	70	40	7	315	291	440	300	2	--	--	5,025	631	7,572		
Sandwich	2	90	250	3	135	109	220	150	1	--	--	4,645	509	6,108		
Remainder of County	16	720	1,340	12	540	1,039	1,420	1,000	2	--	--	15,680	3,379	40,548		
<u>De Witt:</u>																
Clinton	2	70	40	4	180	200	220	150	1	--	--	4,670	390	4,680		
Remainder of County	8	360	690	5	225	300	430	300	1	--	--	10,415	1,290	15,480		
<u>Douglas</u>																
<u>Edgar:</u>																
Paris	2	70	40	7	315	361	220	150	1	--	--	4,805	551	6,612		
Remainder of County	14	630	1,160	8	360	533	640	450	1	--	--	14,630	2,143	25,716		
<u>Edwards</u>																
<u>Effingham:</u>																
Effingham	2	70	40	3	135	115	220	150	1	--	--	4,625	305	3,660		
Remainder of County	16	720	1,190	7	315	513	710	500	1	--	--	14,745	2,203	26,436		

Table B-6 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering			911 Call Answerers/ Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Equipment Cost		Number Needed	Additional Staff	Monthly Cost	Initial		Monthly	Annual	
		Initial	Monthly		Initial	Monthly	Initial	Monthly								Number Needed in B.H.
<u>Fayette:</u> <u>Vandalia</u>	2	\$ 70	\$ 40	3	\$ 135	\$ 145	\$ 220	\$ 150	1	--	--	\$ 4,625	\$ 335	\$ 4,020		
Remainder of County	16	720	1,360	4	180	306	710	500	1	--	--	14,610	2,166	25,992		
<u>Ford</u>																
<u>Franklin:</u> <u>Benton</u>	2	70	40	4	180	173	220	150	1	--	--	4,670	363	4,356		
<u>W. Frankfort</u>	2	70	40	4	180	166	220	150	1	--	--	4,670	356	4,272		
Remainder of County	12	540	880	4	180	233	570	400	1	--	--	14,290	1,513	18,156		
<u>Fulton:</u> <u>Canton</u>	2	70	40	6	270	330	440	300	2	--	--	4,980	670	8,040		
Remainder of County	30	1,330	2,870	16	720	1,546	1,200	850	1	--	--	29,250	5,266	63,192		
<u>Gallatin</u>																
<u>Green</u>																
<u>Grundy:</u> <u>Morris</u>	2	70	40	3	135	140	220	150	1	--	--	4,625	330	3,960		
Remainder of County	10	450	820	7	315	350	500	350	1	--	--	14,265	1,520	18,240		
<u>Hamilton</u>																
<u>Hancock</u>																
<u>Hardin</u>																
<u>Henderson</u>																
<u>Henry:</u> <u>Genesco</u>	2	70	40	4	180	193	220	150	1	--	--	4,670	383	4,596		
<u>Kewanee</u>	2	70	40	7	315	326	440	300	2	--	--	5,025	666	7,992		
Remainder of County	24	1,060	1,850	13	585	975	1,980	1,400	2	--	--	29,625	4,225	50,700		
<u>Iroquois:</u> <u>Watseka</u>	2	70	40	1	35	45	220	150	1	--	--	4,525	235	2,820		
Remainder of County	36	1,620	3,350	23	1,035	1,801	2,820	2,000	2	--	--	31,475	7,151	85,812		

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

Area	Incoming 911 Trunks		Outgoing Transfer Lines		Call Answering and Transfer		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost				
	Number	Cost		Number	Cost		Number Needed	Additional Staff			Initial	Monthly	Annual		
		Initial	Monthly		Initial	Monthly		Number Needed	Monthly Cost						
														in B.H.	Number Needed
Jackson:															
Carbondale	2	\$ 70	\$ 40	4	\$ 180	\$ 200	\$ 440	\$ 300	2	--	--	\$ 4,200	\$ 4,890	\$ 540	\$ 6,480
Murphysboro	2	70	40	4	180	213	220	150	1	--	--	4,200	4,670	403	4,836
Remainder of County	10	450	800	10	450	700	500	350	1	--	--	13,000	14,400	1,850	22,200
Jasper															
Jefferson:															
Mt. Vernon	2	70	40	6	270	280	440	300	2	--	--	4,200	4,980	620	7,440
Remainder of County	16	720	1,230	4	180	253	710	500	1	--	--	13,000	14,610	1,983	23,796
Jersey:															
Jerseyville	2	70	40	4	180	186	220	150	1	--	--	4,200	4,670	376	4,512
Remainder of County	6	270	430	3	135	170	360	250	1	--	--	9,400	10,165	850	10,200
JoDavies															
Johnson															
Kane:															
Carpentersville,															
E. Dundee, Gilberts,															
Sleepy Hollow,															
W. Dundee	2	90	80	12	540	500	440	300	2	--	--	4,200	5,270	880	10,560
Elgin, S. Elgin	3	105	60	11	495	440	510	350	2	--	--	4,200	5,310	850	10,200
Batavia, Geneva,															
St. Charles	7	285	240	9	405	360	790	550	2	--	--	9,400	10,880	1,150	13,800
Aurora, Montgomery,															
N. Aurora, Sugar Grove	6	230	200	16	720	720	1,080	750	3	--	--	9,400	11,430	1,670	20,040
Burlington, Elburn,															
Hampshire, Maple															
Park, Pingree Grove,															
Valley View, Wayne	12	540	1,130	14	630	1,026	570	400	1	--	--	13,000	14,740	2,556	30,672

Table B-6 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks		Outgoing Transfer Lines		Call Answering and Transfer		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost				
	Number	Cost		Number	Cost		Number Needed in B.H.	Additional Staff			Initial	Monthly	Annual		
		Initial	Monthly		Initial	Monthly		Number Needed	Monthly Cost						
<u>Kankakee:</u> Kankakee, Bourbonnais, Bradley Remainder of County	3	\$ 105	\$ 60	15	\$ 675	\$ 825	\$ 510	\$ 350	2	--	--	\$ 4,200	\$ 5,490	\$ 1,235	\$14,820
	14	630	1,210	14	630	1,213	1,280	900	2	--	--	13,000	15,540	3,323	39,876
	2	70	40	6	270	220	220	150	1	--	--	4,200	4,760	410	4,920
	10	420	600	6	270	340	500	350	1	--	--	13,000	14,190	1,290	15,480
<u>Knox:</u> Galesburg Remainder of County	3	105	60	10	450	533	510	350	2	--	--	4,200	5,265	943	11,316
	22	990	1,950	10	450	700	1,840	1,300	2	--	--	26,000	29,280	3,950	47,400
<u>La Salle:</u> La Salle, Peru Marseilles Mendota Ottawa Streator Remainder of County	2	70	40	9	405	420	440	300	2	--	--	4,200	5,115	760	9,120
	2	90	130	5	225	250	220	150	1	--	--	4,200	4,735	530	6,360
	2	90	240	3	135	135	220	150	1	--	--	4,200	4,645	525	6,300
	2	70	40	3	135	140	440	300	2	--	--	4,200	4,845	480	5,760
	2	90	230	5	225	258	440	300	2	--	--	4,200	4,955	788	9,456
	30	1,350	3,080	16	720	1,466	2,400	1,700	2	--	--	26,000	30,470	6,246	74,952
	2	70	40	6	270	270	220	150	1	--	--	4,200	4,760	460	5,520
<u>Lawrence:</u> Lawrenceville Remainder of County	12	540	820	4	180	220	570	400	1	--	--	13,000	14,290	1,440	17,280
	2	70	40	5	225	200	440	300	2	--	--	4,200	4,935	540	6,480
<u>Lee:</u> Dixon Remainder of County	20	900	2,150	10	450	916	850	600	1	--	--	26,000	28,200	3,666	43,992
	2	70	40	4	180	200	220	150	1	--	--	4,200	4,670	390	4,680
<u>Livingston:</u> Pontiac Remainder of County	30	1,350	3,050	15	1,125	1,350	2,400	1,700	2	--	--	26,000	30,875	6,100	73,200

Table B-6 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Equipment Cost		Number Needed	Additional Staff			Initial	Monthly	Annual
		Initial	Monthly		Number Needed in B.H.	Number Needed				Monthly Cost					
<u>Logan:</u> Lincoln	2	\$ 70	\$ 40	7	\$315	\$ 326	\$ 440	\$300	2	--	--	\$ 5,025	\$ 666	\$ 1,992	
Remainder of County	20	900	1,660	11	495	788	850	600	1	--	--	28,245	3,048	36,576	
<u>McDonough:</u> Macomb	2	70	40	5	225	225	440	300	2	--	--	4,935	565	6,780	
Remainder of County	18	810	1,500	9	405	600	780	550	1	--	--	14,995	2,650	31,800	
<u>McHenry:</u> Hebron, Lakemoor, McCullom Lake, McHenry, Richmond, Spring Grove, Sunnyside	12	520	650	16	720	800	570	400	1	--	--	14,810	1,850	22,200	
Algonquin, Barrington Hills, Cary, Crystal Lake, Fox River Grove, Fox River Gardens, Huntley, Lake in the Hills, Lakewood, Oakwood Hills	8	340	360	20	900	1,000	860	600	2	--	--	11,500	1,960	23,520	
Harvard, Marengo, Union, Woodstock	8	340	410	13	585	845	860	600	2	--	--	11,185	1,855	22,260	
<u>McHenry:</u> Algonquin	2	70	40	5	225	208	220	150	1	--	--	4,715	398	4,776	
Crystal Lake	2	70	40	6	270	230	440	300	2	--	--	4,980	570	6,840	
Harvard	2	70	40	5	225	225	220	150	1	--	--	4,715	415	4,980	
McHenry	2	70	40	5	225	183	220	150	1	--	--	4,715	373	4,476	
Marengo	2	70	40	5	225	225	220	150	1	--	--	4,715	415	4,980	
Woodstock	2	70	40	5	225	225	220	150	1	--	--	4,715	415	4,980	
Remainder of County	14	540	1,100	8	360	466	1,280	900	2	--	--	15,180	2,466	29,592	

Table B-6 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer			911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Equipment	Cost	Number Needed	Additional Staff		Initial		Monthly	Annual	
		Initial	Monthly		Initial	Monthly				Number Needed in B.H.	Monthly Cost					
<u>McLean:</u>																
Bloomington	3	\$ 105	\$ 60	9	\$ 315	\$ 180	\$ 510	\$ 350	2	--	--	\$ 5,130	\$ 4,790	\$57,480		
Normal	2	70	40	9	315	180	440	300	2	--	--	5,025	520	6,240		
Remainder of County	36	1,620	3,670	20	900	2,000	2,820	2,000	2	--	--	44,340	7,670	92,040		
<u>Macon:</u>																
Decatur	3	105	60	9	405	375	765	525	3	--	--	5,475	960	11,520		
Remainder of County	20	2,010	3,060	12	540	840	1,700	1,200	2	--	--	30,250	5,100	61,200		
<u>Macoupin:</u>																
Carlinville	2	70	40	3	135	155	220	150	1	--	--	4,625	345	4,140		
Remainder of County	34	1,260	2,880	7	315	606	2,680	1,900	2	--	--	43,255	5,386	64,632		
<u>Madison:</u>																
Alton	3	105	60	7	315	326	510	350	2	--	--	5,130	736	8,832		
Bethalto	2	70	40	8	360	400	220	150	1	--	--	4,850	590	7,080		
Collinsville	2	70	40	9	405	375	440	300	2	--	--	5,115	715	8,580		
Edwardsville, E. Alton	2	70	40	7	315	303	440	300	2	--	--	5,025	643	7,716		
Granite City, Madison	3	105	60	13	585	520	510	350	2	--	--	5,400	930	11,160		
Highland	2	70	40	5	225	208	220	150	1	--	--	4,715	398	4,776		
Wood River	2	70	40	7	315	291	440	300	2	--	--	5,025	631	7,572		
Remainder of County	22	990	1,780	14	630	933	2,760	1,950	3	--	--	30,380	4,663	55,956		
<u>Madison:</u>																
Alton, Bethalto, Wood River	7	285	260	18	810	960	1,185	825	3	--	--	11,680	2,045	24,540		
Collinsville	2	70	40	7	315	256	440	300	2	--	--	5,025	596	7,152		
Granite City, Madison	3	105	60	13	585	541	510	350	2	--	--	5,400	951	11,412		
Highland	2	70	40	5	225	208	220	150	1	--	--	4,715	398	4,776		
Remainder of County	24	1,060	1,820	18	810	1,230	2,970	2,100	3	--	--	30,840	5,150	61,800		
<u>Marion:</u>																
Centralia	2	70	40	7	315	361	440	300	2	--	--	5,025	701	8,412		
Salem	2	70	40	4	180	193	220	150	1	--	--	4,670	383	4,596		
Remainder of County	12	540	830	5	225	341	570	400	1	--	--	14,335	1,571	18,852		

Table B-6 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks		Outgoing Transfer Lines		Call Answering and Transfer		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Initial	Monthly	Initial	Monthly	Equipment Cost	Number Needed in B.H.	Additional Staff		Cost
		Initial	Monthly								Number Needed	Monthly Cost	
<u>Marshall</u>													
<u>Mason</u>													
<u>Massac:</u>													
Metropolis	2	\$ 70	\$ 40	4	\$ 180	\$ 186	\$ 220	\$ 150		1	--	--	\$ 4,200
Remainder of County	4	180	230	4	180	233	290	200		1	--	--	4,200
<u>Menard</u>													
<u>Mercer</u>													
<u>Monroe</u>													
<u>Montgomery:</u>													
Litchfield	2	70	40	4	180	193	220	150		1	--	--	4,200
Remainder of County	20	880	1,600	4	180	366	850	600		1	--	--	26,000
<u>Morgan:</u>													
Jacksonville	2	70	40	5	225	250	440	300		2	--	--	4,200
Remainder of County	16	720	1,330	9	405	555	710	500		1	--	--	13,000
<u>Moultrie</u>													
<u>Ogle:</u>													
Rochelle	2	70	40	7	315	326	220	150		1	--	--	4,200
Remainder of County	20	880	1,660	12	540	1,059	1,700	1,200		2	--	--	26,000
<u>Peoria:</u>													
Chillicothe	2	90	110	3	135	140	220	150		1	--	--	4,200
Peoria, Peoria Hgts, Bartonville	12	420	240	15	675	825	2,880	1,880		4	--	--	13,000
Remainder of County	18	1,620	1,390	7	315	583	1,560	1,100		2	--	--	13,000
<u>Perry:</u>													
DuQuoin	2	70	40	4	180	166	220	150		1	--	--	4,200
Remainder of County	8	340	510	6	270	400	430	300		1	--	--	9,400
<u>Platt</u>													
<u>Pike</u>													

Table B-6 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering And Transfer		911 Call Answerers/ Dispatchers			Logging Recorder Cost	Overall Cost			
	Number	Cost		Number	Cost		Equipment Cost		Number Needed in B.H.	Additional Staff			Initial	Monthly	Annual	
		Initial	Monthly		Initial	Monthly	Number Needed	Monthly Cost								
<u>Pope</u>																
<u>Pulaski</u>																
<u>Putnam</u>																
<u>Randolph:</u>																
Chester	2	\$ 70	\$ 40	4	\$180	\$ 180	\$ 220	\$ 150	1	--	--	\$ 4,200	\$ 4,670	\$ 370	\$ 4,440	
Remainder of County	22	990	2,490	8	360	653	1,840	1,300	2	--	--	26,000	29,190	4,443	53,316	
<u>Richland:</u>																
Olney	2	70	40	4	180	160	220	150	1	--	--	4,200	4,670	350	4,200	
Remainder of County	10	450	620	3	135	175	500	350	1	--	--	13,000	14,085	1,145	13,740	
<u>Rock Island:</u>																
East Moline	2	70	40	8	360	266	440	300	2	--	--	4,200	5,070	606	7,272	
Moline	3	105	60	9	405	360	510	350	2	--	--	4,200	5,220	770	9,240	
Rock lsland	5	175	100	9	405	495	650	450	2	--	--	9,600	10,630	1,045	12,540	
Remainder County	12	540	1,150	12	540	900	1,140	800	2	--	--	13,000	15,220	2,850	34,200	
<u>Rock Island:</u>																
East Moline, Moline																
Rock lsland	10	420	385	18	810	1,020	2,600	1,680	4	--	--	13,000	16,830	3,085	37,020	
Remainder of County	12	540	1,150	13	585	975	1,140	800	2	--	--	13,000	15,265	2,925	35,100	
<u>St. Clair:</u>																
Belleville, Swansea	3	105	60	11	495	458	510	350	2	--	--	4,200	5,310	868	10,416	
East St. Louis	3	105	60	13	585	520	765	525	3	--	--	4,200	5,655	1,105	13,260	
Fairview Heights, O'Fallon	2	70	40	3	135	150	440	300	2	--	--	4,200	4,845	490	5,880	
Mascoutah	2	70	40	4	180	166	220	150	1	--	--	4,200	4,670	356	4,272	
Remainder of County	24	1,080	2,070	12	540	1,040	1,980	1,400	2	--	--	26,000	29,600	4,510	54,120	
<u>St. Clair:</u>																
Belleville, E. St. Louis, Fairview Hgts, Swansea, O'Fallon	8	330	420	17	765	991	2,320	1,480	4	--	--	9,400	12,815	2,891	34,692	
Remainder of County	26	1,170	2,220	13	585	975	2,120	1,500	2	--	--	26,000	29,875	4,695	56,340	
<u>Saline:</u>																
Harrisburg	2	70	40	4	180	220	220	150	1	--	--	4,200	4,670	410	4,920	
Remainder of County	6	270	380	4	180	240	360	250	1	--	--	9,400	10,210	870	10,440	

Table B-6 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer Equipment Cost			911 Call Answerers/Dispatchers				Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Initial	Monthly	Number Needed	Number Needed in B.H.	Additional Staff	Monthly Cost	Initial		Monthly	Annual	
<u>Sangamon:</u>	2	\$ 70	\$ 40	8	\$ 360	\$ 386	\$ 660	\$ 450	3	--	--	\$ 5,290	\$ 876	\$ 10,512			
Springfield	28	1,260	2,460	14	630	1,330	2,260	1,600	2	--	--	30,150	5,390	64,680			
Remainder of County																	
<u>Schuyler</u>																	
<u>Scott</u>																	
<u>Shelby:</u>	2	70	40	4	180	220	220	150	1	--	--	4,670	410	4,920			
Shelbyville	22	990	1,970	10	450	916	920	650	1	--	--	28,360	3,536	42,432			
Remainder of County																	
<u>Stark</u>																	
<u>Stephenson:</u>	3	105	60	7	315	361	510	350	2	--	--	5,130	771	9,252			
Freeport	18	810	1,430	8	360	533	780	550	1	--	--	14,950	2,513	30,156			
Remainder of County																	
<u>Tazewell:</u>	2	70	40	5	225	216	440	300	2	--	--	4,935	556	6,672			
CreveCoeur, E. Peoria	2	70	40	3	135	115	220	150	1	--	--	4,625	305	3,660			
Morton	3	105	60	4	180	186	510	350	2	--	--	4,995	596	7,152			
Pekin	2	90	105	3	135	110	220	150	1	--	--	4,645	365	4,380			
Washington	26	1,170	2,230	19	855	1,298	2,120	1,500	2	--	--	30,145	5,028	60,336			
Remainder of County																	
<u>Union:</u>	2	70	40	2	90	123	220	150	1	--	--	4,580	313	3,756			
Anna	4	180	250	6	270	400	290	200	1	--	--	4,940	850	10,200			
Remainder of County																	
<u>Vermilion:</u>	3	105	60	9	405	390	510	350	2	--	--	5,220	800	9,600			
Danville	2	70	40	3	135	115	220	150	1	--	--	4,625	305	3,660			
Hoopeston	36	1,800	4,080	16	720	1,680	2,820	2,000	2	--	--	31,340	7,760	93,120			
Remainder of County																	

Table B-6 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer Equipment Cost			911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Equipment Cost		Number Needed in B.H.	Additional Staff		Cost		Initial	Monthly	Annual
		Initial	Monthly		Initial	Monthly	Initial	Monthly		Number Needed	Monthly Cost					
<u>Wabash:</u>																
Mt. Carmel	2	\$ 70	\$ 40	4	\$ 180	\$ 180	\$ 220	\$ 150	1	--	--	\$ 4,200	\$ 4,670	\$ 370	\$ 4,440	
Remainder of County	4	180	260	4	180	200	290	200	1	--	--	4,200	4,850	660	7,800	
<u>Warren:</u>																
Monmouth	2	70	40	6	270	290	220	150	1	--	--	4,200	4,760	480	5,760	
Remainder of County	12	540	910	3	135	220	570	400	1	--	--	13,000	14,245	1,530	18,360	
<u>Washington</u>																
<u>Wayne:</u>																
Fairfield	2	70	40	3	135	160	220	150	1	--	--	4,200	4,625	350	4,200	
Remainder of County	12	540	1,000	6	270	430	570	400	1	--	--	13,000	14,380	1,830	21,960	
<u>White:</u>																
Carmi	2	70	40	4	180	233	220	150	1	--	--	4,200	4,670	423	5,076	
Remainder of County	14	630	1,110	7	315	525	640	450	1	--	--	13,000	14,585	2,085	25,020	
<u>Whiteside:</u>																
Sterling, Rockfalls	3	105	60	6	270	330	510	350	2	--	--	4,200	5,085	740	8,880	
Remainder of County	18	790	1,410	11	495	715	1,560		2	--	--	13,000	15,845	3,225	38,700	
<u>Will:</u>																
Bolingbrook	4	180	160	4	180	180	290	200	1	--	--	4,200	4,850	540	6,480	
Crest Hill, Joliet, Rockdale, Shorewood	6	210	120	11	495	458	1,080	750	3	--	--	9,400	11,185	1,328	15,936	
Lockport, Romeoville	2	90	90	5	225	216	440	300	2	--	--	4,200	4,955	606	7,272	
Remainder of County	26	1,170	2,580	19	855	1,741	3,180	2,250	3	--	--	26,000	31,205	6,571	78,852	
<u>Williamson:</u>																
Herrin	2	70	40	5	225	183	220	150	1	--	--	4,200	4,715	373	4,476	
Marion	2	70	40	4	180	180	220	150	1	--	--	4,200	4,670	370	4,440	
Remainder of County	12	540	890	8	360	506	1,140	800	2	--	--	13,000	15,040	2,196	26,352	

Table B-6 (concluded)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- SUBCOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer Equipment Cost		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Initial	Monthly	Number Needed	Additional Staff	Initial		Monthly	Annual	
		Initial	Monthly		Number Needed	Monthly Cost									
<u>Winnebago:</u> Rockton, Love Park	2	\$ 70	\$ 40	4	\$ 180	\$ 133	\$ 440	\$ 300	2	--	--	\$ 4,200	\$ 4,890	\$ 473	\$ 5,676
So. Beloit	2	70	40	4	180	186	220	150	1	--	--	4,200	4,670	376	4,512
Remainder of County (Rockford)	20	900	1,620	17	765	1,133	4,000	2,680	4	--	--	26,000	31,665	5,433	65,196
<u>Woodford</u>															

Table B-7

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- MULTICOUNTY SYSTEMS -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer Equipment Cost			911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost			
	Number	Cost		Number	Cost		Initial	Monthly		Number Needed	in B.H.	Number Needed		Monthly Cost	Initial	Monthly	Annual
		Initial	Monthly		Initial	Monthly											
Alexander & Pulaski	18	\$ 790	\$ 1,150	12	\$ 540	\$ 900	\$ 780	\$ 550	1	--	--	--	\$ 13,000	\$15,110	\$ 2,600	\$ 31,200	
Brown & Schuyler	16	700	1,430	16	720	1,360	710	500	1	--	--	--	13,000	15,130	3,290	39,480	
Calhoun & Jersey	18	790	1,670	8	360	1,000	780	550	1	--	--	--	13,000	14,930	3,220	38,640	
Clark & Cumberland	18	790	2,080	14	630	1,750	780	550	1	--	--	--	13,000	15,200	4,380	52,560	
Clinton & Washington	42	1,870	3,950	25	1,125	2,125	3,240	2,300	2	3	\$ 2,400	39,000	45,235	10,775	129,300		
Edwards & Wabash	16	700	1,280	13	585	1,040	710	500	1	--	--	--	13,000	14,995	2,820	33,840	
Hamilton & Saline	22	970	2,520	14	630	1,540	1,840	1,300	2	3	2,400	26,000	29,440	7,760	93,120		
Hancock & Henderson	40	1,780	4,210	28	1,260	4,200	1,550	1,100	1	--	--	39,000	43,590	9,510	114,120		
Hardin & Pope	14	610	1,020	9	405	765	640	450	1	--	--	13,000	14,655	2,235	26,820		
Mason & Menard	28	1,240	3,110	20	900	1,900	1,130	800	1	--	--	26,000	29,270	5,810	69,720		
Pike & Scott	32	1,420	3,030	19	855	2,375	1,270	900	1	--	--	26,000	29,545	6,305	15,660		
Douglas, Moultrie, & Piatt	40	1,780	4,910	27	1,215	2,835	3,100	2,200	2	3	2,400	39,000	45,095	12,345	148,140		
Johnson, Massac, & Pope	20	880	2,070	14	630	1,330	850	600	1	--	--	26,000	28,360	4,000	48,000		
Marshall, Putnam, & Stark	38	1,690	3,610	25	1,125	2,625	1,480	1,050	1	--	--	26,000	30,295	7,285	87,420		
Gallatin, Hamilton, Hardin, Pope, & Saline	44	1,960	5,180	34	1,530	4,590	3,380	2,400	2	3	2,400	39,000	45,870	14,570	174,840		
ISP Alternatives: DeKalb & Kane-- except cities of Aurora, Batavia, Carpentersville, DeKalb, Elgin, Geneva, & St. Charles	32	1,440	4,300	68	3,060	8,500	2,540	1,800	2	--	--	26,000	33,040	14,600	175,200		

Table B-7 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- MULTICOUNTY SYSTEMS -

Area	Incoming 911 Trunks		Outgoing Transfer Lines		Call Answering and Transfer Equipment Cost		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost					
	Number	Cost	Number	Cost	Initial	Monthly	Number Needed	Additional Staff	Initial		Monthly	Annual				
													Initial	Monthly	Number Needed	Monthly Cost
ISP Alternatives: Edwards, Gallatin, Hamilton, Hardin, Pope, Saline, Wabash, Wayne, & White	90	\$ 4,030 \$14,350	56	\$ 2,520 \$10,080	\$ 6,600	\$ 4,700	--	2	--	\$ 65,000	\$ 78,150	\$29,130	\$349,560			
Alexander, Franklin, Jackson, Jefferson, Johnson, Massac, Perry, Pulaski, Randolph, Union, & Williamson--except cities of Carbondale & Mt. Vernon	132	5,920 24,180	96	4,320 19,680	14,310	10,200	--	3	--	91,000	115,550	54,060	648,720			
Bond, Clinton, Monroe, & Washington	58	2,590 10,930	33	1,485 6,600	4,360	3,100	--	2	--	52,000	60,435	20,630	247,560			
Calhoun, Greene, Jersey, Macoupin, Montgomery, Pike, & Scott	116	5,200 22,800	57	2,565 12,255	8,420	6,000	--	2	--	91,000	107,185	41,055	492,660			
Cass, Christian, Logan, Mason, Menard, Morgan, & Sangamon-- except cities of Jacksonville, Lincoln, & Springfield	105	4,725 18,480	83	3,735 12,450	11,475	8,175	--	3	--	78,000	97,935	39,105	469,260			
Adams, Brown, Fulton, Hancock, Henderson, McDonough, Schuyler, & Warren--except cities of Macomb & Quincy	148	6,660 24,170	99	4,455 18,315	10,660	7,600	--	2	--	104,000	125,775	50,085	601,020			

Table B-7 (continued)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- MULTICOUNTY SYSTEMS -

Area	Incoming 911 Trunks		Outgoing Transfer Lines		Call Answering and Transfer Equipment Cost		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost				
	Number	Cost		Number	Cost		Number Needed	Additional Staff			Initial	Monthly	Annual		
		Initial	Monthly		Initial	Monthly		Number Needed in B.H.	Monthly Cost						
ISP Alternatives: Grundy, Kankakee, Kendall, & Will--except cities of Joliet & Kankakee Bureau, La Salle, Lee, & Putnam--except city of Dixon Dewitt, Ford, Iroquois, Livingston & McLean--except cities of Bloomington & Normal Champaign, Coles, Douglas, Edgar, Macon, Moultrie, Piatt, Shelby, & Vermilion--except cities of Champaign, Charleston, Danville, Decatur, Mattoon, & Urbana Clark, Clay, Crawford, Cumberland, Effingham, Fayette, Jasper, Lawrence, Marion, & Richland --except city of Centralia	70	\$3,150	\$ 8,930	92	\$4,140	\$11,500	\$ 7,800	\$ 5,550	3	--	--	\$ 52,000	\$ 67,090	\$25,980	\$311,760
	104	4,660	13,600	82	3,690	11,480	11,370	8,100	3	--	--	78,000	97,720	33,180	398,160
	125	5,605	24,690	91	4,095	18,200	9,050	6,450	2	--	--	91,000	109,750	49,340	592,080
	135	6,055	33,530	133	5,985	29,925	14,625	10,425	3	--	--	104,000	130,665	73,880	886,560
	127	5,695	24,280	64	2,880	12,480	9,190	6,550	2	--	--	91,000	106,125	43,310	519,720

Table B-7 (concluded)

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- MULTICOUNTY SYSTEMS -

Area	Incoming 911 Trunks		Outgoing Transfer Lines		Call Answering and Transfer Equipment Cost		911 Call Answerers/Dispatchers		Logging Recorder Cost	Overall Cost					
	Number	Cost	Number	Cost	Initial Monthly	Monthly	Initial Monthly	Monthly		Number Needed in B.H.	Number Needed	Additional Staff Monthly Cost			
ISP Alternatives: Marshall, Peoria, Stark, Tazewell, & Woodford--except cities of East Peoria, Pekin, & Peoria	89	\$ 4,005	\$ 12,750	80	\$ 3,600	\$ 10,800	\$ 9,795	\$ 6,975	3	--	--	\$ 65,000	\$ 82,400	\$ 30,525	\$ 366,300
Henry, Knox, Mercer, Rock Island, & Whiteside--except cities of East Moline, Galesburg, Moline, Rock Falls, Rock Island, & Sterling	104	4,680	18,000	97	4,365	15,520	11,370	8,100	3	--	--	78,000	98,415	41,620	499,440
Boone, Carroll, Jo Daviess, Ogle, Stephenson, & Winnebago--except city of Rockford	103	4,635	18,120	94	4,230	18,330	11,265	8,025	3	--	--	78,000	98,130	44,475	533,700

Table B-8

LOCAL ALTERNATIVE 911 SYSTEMS COSTS

- COOK, DU PAGE, AND LAKE COUNTIES -

Area	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer Equipment Cost		911 Call Answerers/Dispatchers			Logging Recorder Cost	Overall Cost		
	Number	Cost		Number	Cost		Equipment Cost		Number Needed In B.H.	Additional Staff			Initial	Monthly	Annual
		Initial	Monthly		Initial	Monthly	Number Needed	Monthly Cost							
Cook County:															
Schaumburg & S.A.*	6	\$ 240	\$ 210	15	\$ 675	\$ 750	\$ 720	\$ 500	2	--	--	\$ 9,400	\$11,035	\$ 1,460	\$ 17,520
Arlington Heights & S.A.	10	410	365	15	675	615	2,600	1,680	4	3	\$3,000	13,000	16,685	5,660	67,920
Park Ridge & S.A.	10	390	300	13	585	585	1,500	1,050	3	--	--	13,000	15,475	1,935	23,220
NORCOM	15	645	720	23	1,035	1,035	3,300	2,180	4	3	3,000	13,000	17,980	6,935	83,220
Glencoe & S.A.	2	70	40	4	140	80	440	300	2	--	--	4,200	4,850	420	5,040
Evanston & S.A.	4	140	80	5	175	100	870	600	3	--	--	9,400	10,585	780	9,360
Berwyn & S.A.	25	1,035	1,125	55	2,475	2,750	5,875	3,975	5	7	7,000	26,000	35,385	14,850	178,200
Oak Park & S.A.	5	175	100	9	405	270	975	675	3	--	--	9,400	10,955	1,045	12,540
Brookfield & S.A.	2	70	40	7	315	210	440	300	2	--	--	4,200	5,025	550	6,600
Burbank & S.A.	14	590	685	31	1,395	1,860	3,160	2,080	4	3	3,000	13,000	18,145	7,625	91,500
Tinley Park & S.A.	3	105	60	4	140	80	510	350	2	--	--	4,200	4,955	490	5,880
Chicago Heights & S.A.	26	1,140	1,675	79	3,555	4,345	4,840	3,280	4	3	3,000	26,000	35,535	12,300	147,600
Du Page County:															
DUCOM	25	1,095	1,395	41	1,845	2,255	5,875	3,975	5	--	--	26,000	34,815	7,625	91,500
Downers Grove & S.A.	6	240	195	21	945	840	1,080	750	3	3	3,000	9,400	11,665	4,785	57,420
Naperville & S.A.	5	195	150	7	315	315	650	450	2	--	--	9,400	10,560	915	10,980
Lake County:															
Barrington & S.A.	2	70	40	8	280	160	440	300	2	--	--	4,200	4,990	500	6,000
Lake Front	6	250	240	16	720	720	720	500	2	--	--	9,400	11,090	1,460	17,520
N.W. Lake County	10	430	500	15	675	900	1,000	700	2	3	3,000	13,000	15,105	5,100	61,200
S.W. Lake County	11	445	550	16	720	800	1,070	750	2	--	--	13,000	15,235	2,100	25,200
Waukegan & S.A.	3	105	60	11	385	220	765	525	3	--	--	4,200	5,455	805	9,660
Winthrop Harbor, Zion & S.A.	2	70	40	6	210	120	440	300	2	--	--	4,200	4,920	460	5,520

*

Table B-9

COMPARISON OF THE ESTIMATED COSTS OF THREE COOK COUNTY ALTERNATIVES
(Excluding Chicago)

Alternative	Number of 911 Systems	Incoming 911 Trunks			Outgoing Transfer Lines			Call Answering and Transfer			911 Call Answerers/ Dispatchers			Logging Recorder Cost	Overall Cost		
		Total Number	Cost		Total Number	Cost		Equipment Costs	Number Needed in B.H.	Additional Staff Number Needed	Additional Staff		Initial		Monthly	Annual	
			Initial	Monthly		Monthly	Cost										
Division by Telephone Central Office Boundaries	12	122	\$ 5,000	\$5,400	260	\$11,600	\$12,700	\$25,300	\$17,000	40	19	\$19,000	\$144,800	\$ 186,700	\$ 54,100	\$ 649,200	
Selectively Routed by Radio District	25	88	730,000*	29,200*	280	9,800	5,600	16,600	11,400	60	9	9,000	172,600	929,000	55,200	662,400	
Selectively Routed by City	124	271	1,800,000*	72,000*	250	8,800	5,000	47,700	32,600	203	--	--	540,600	2,397,100	109,600	1,315,200	

* Estimated Cost of selective call routing

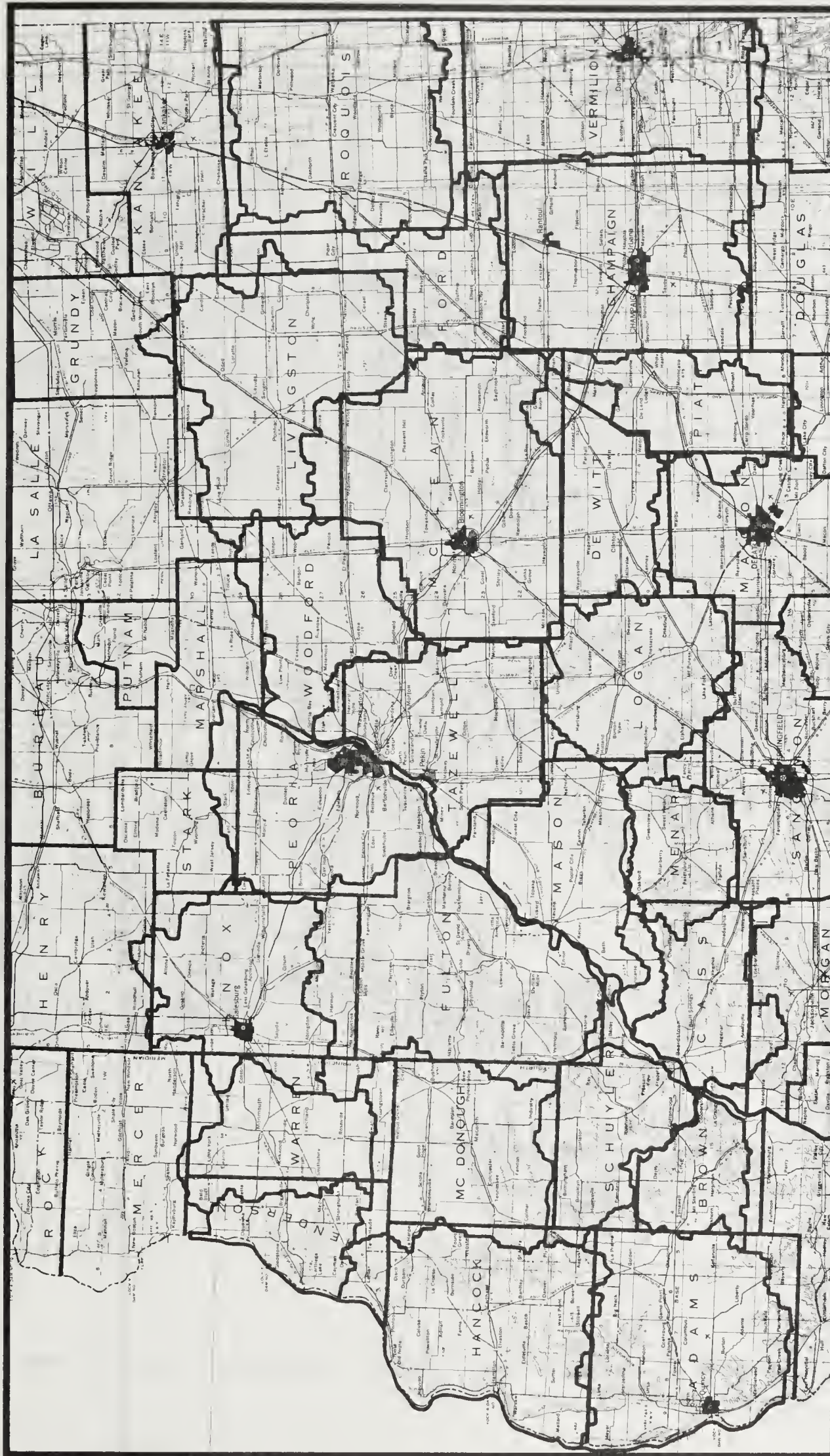


FIGURE B-2
 LOCAL 911 SYSTEM AREA ALTERNATIVES
 - SINGLE COUNTY SYSTEMS -
 NORTH-CENTRAL ILLINOIS

SD-4477-3

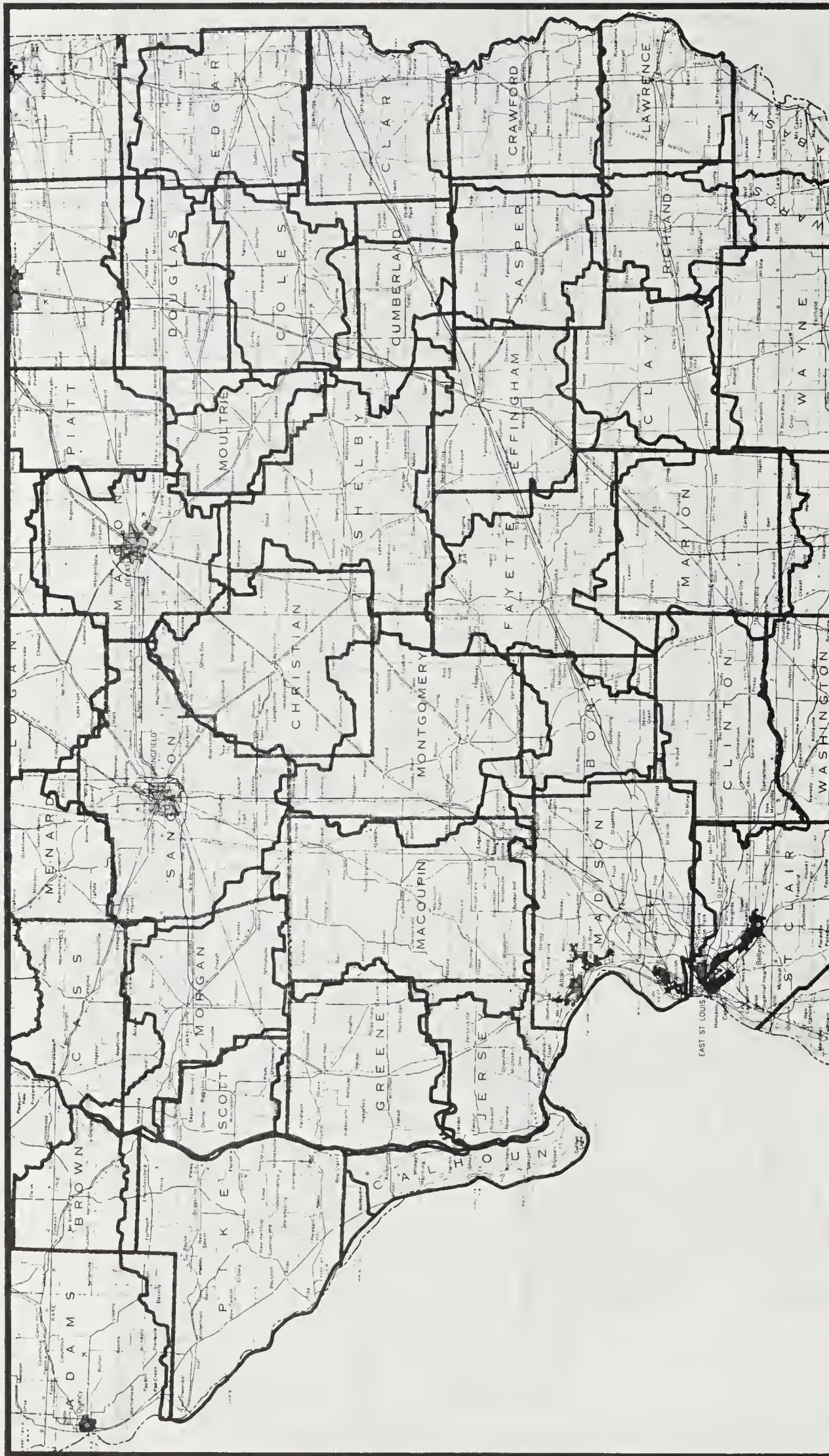


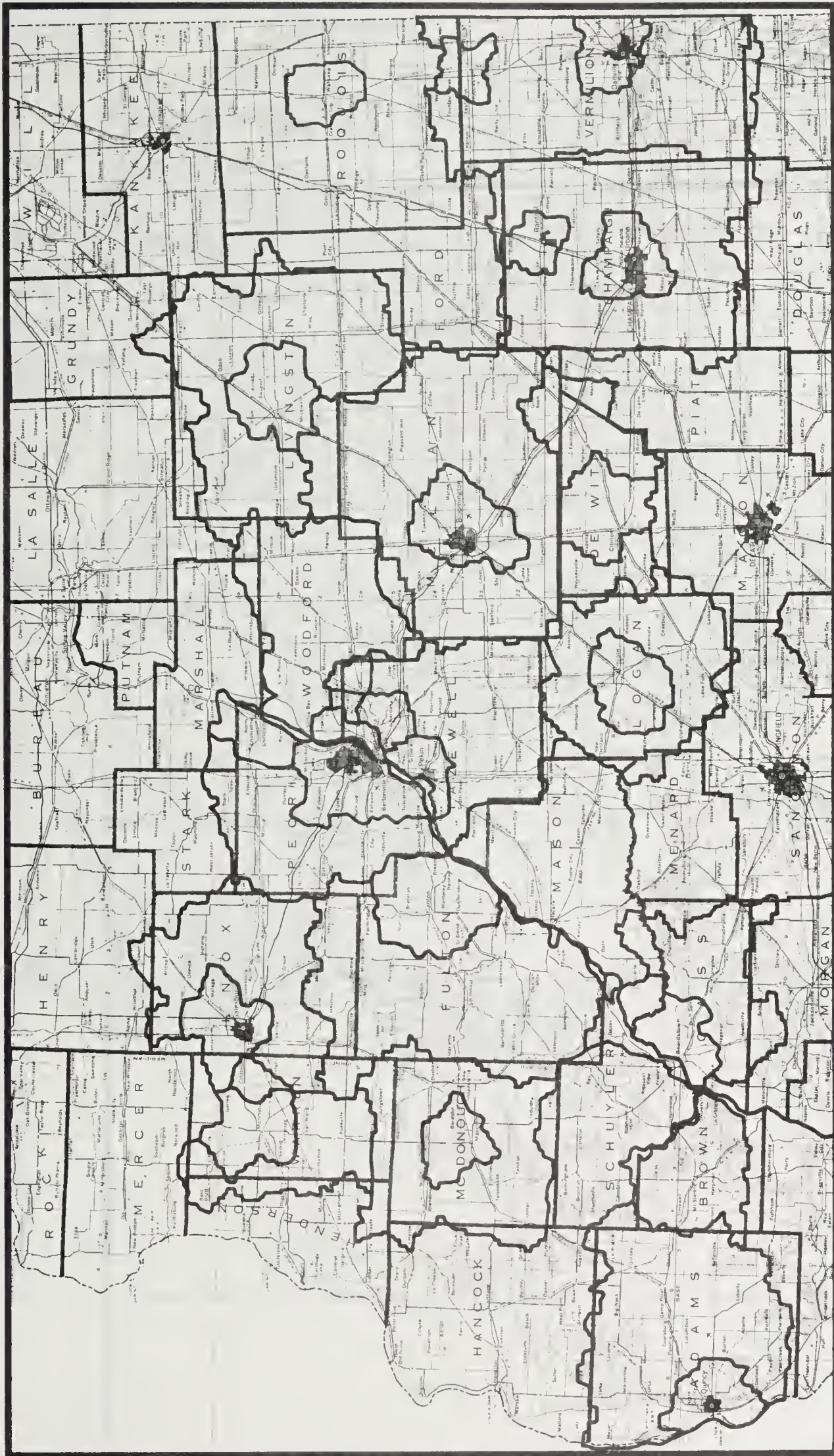
FIGURE B-3
LOCAL 911 SYSTEM AREA ALTERNATIVES
— SINGLE COUNTY SYSTEMS —
SOUTH-CENTRAL ILLINOIS

SD-4477-4



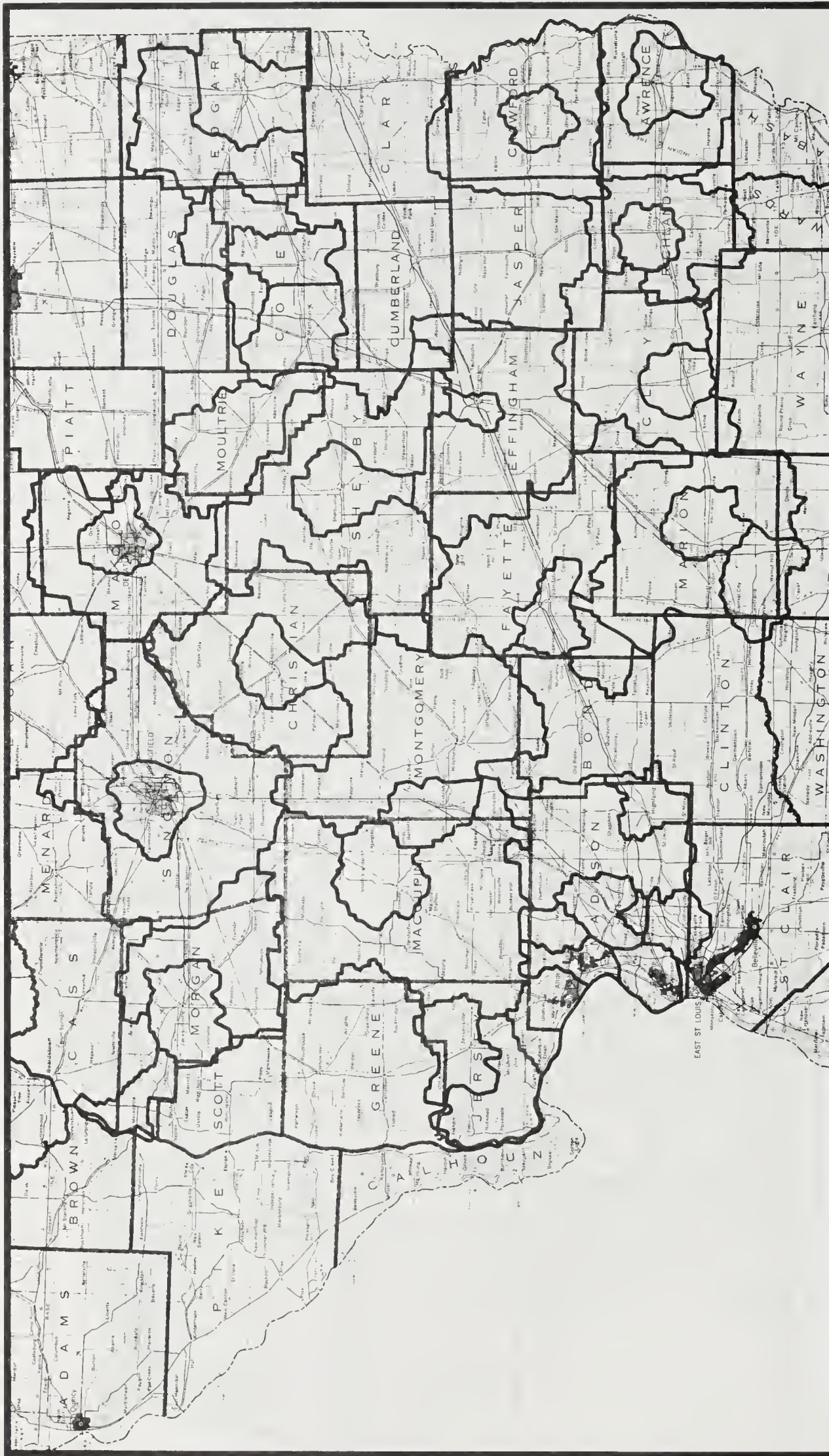
SD-4477-5

FIGURE B-4
LOCAL 911 SYSTEM AREA ALTERNATIVES
— SINGLE COUNTY SYSTEMS —
SOUTHERN ILLINOIS



SD-4477-7

FIGURE B-6
LOCAL 911 SYSTEM AREA ALTERNATIVES
— SUBCOUNTY SYSTEMS —
NORTH-CENTRAL ILLINOIS



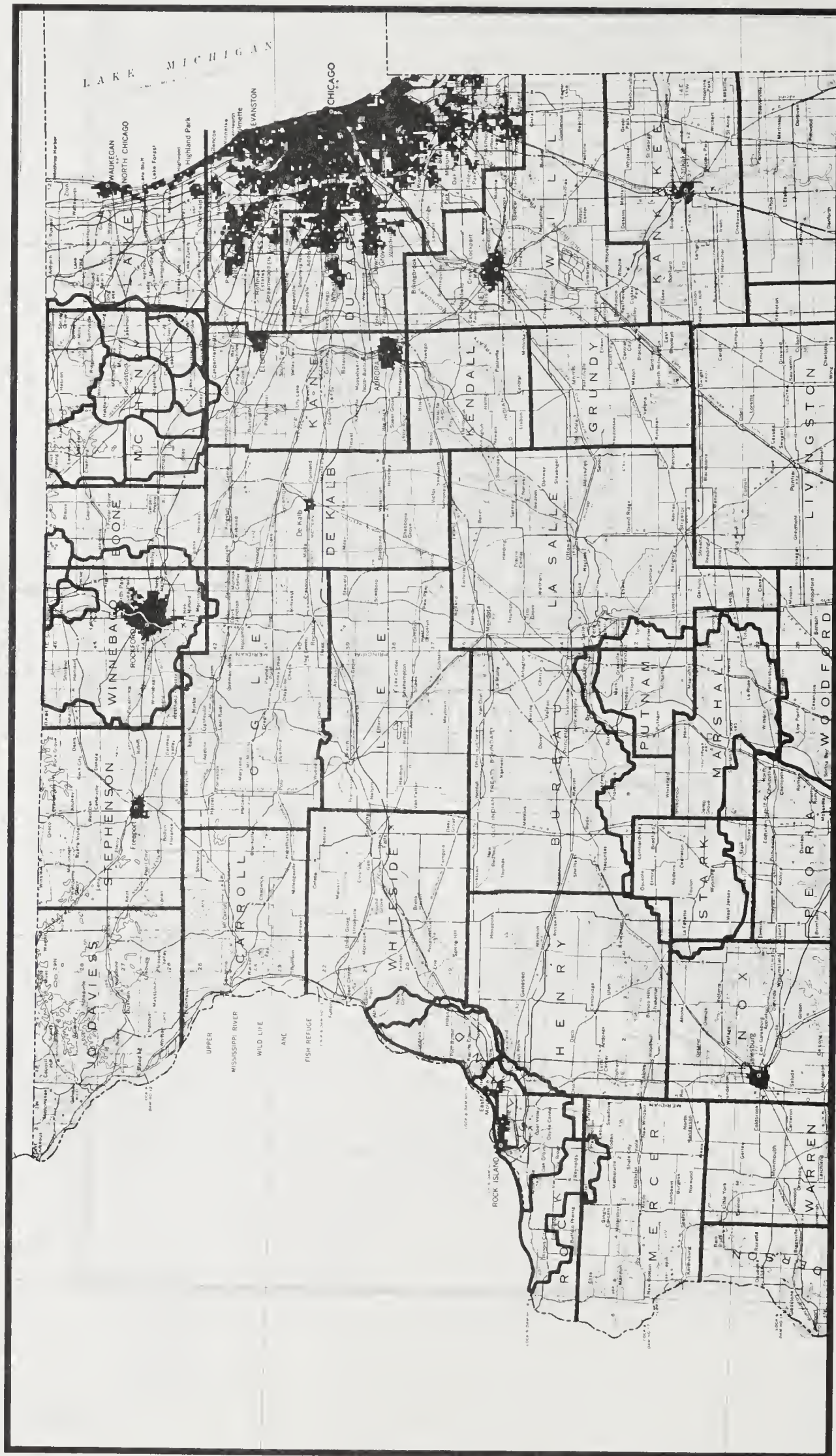
SD-4477-8

FIGURE B-7
LOCAL 911 SYSTEM AREA ALTERNATIVES
— SUBCOUNTY SYSTEMS —
SOUTH-CENTRAL ILLINOIS



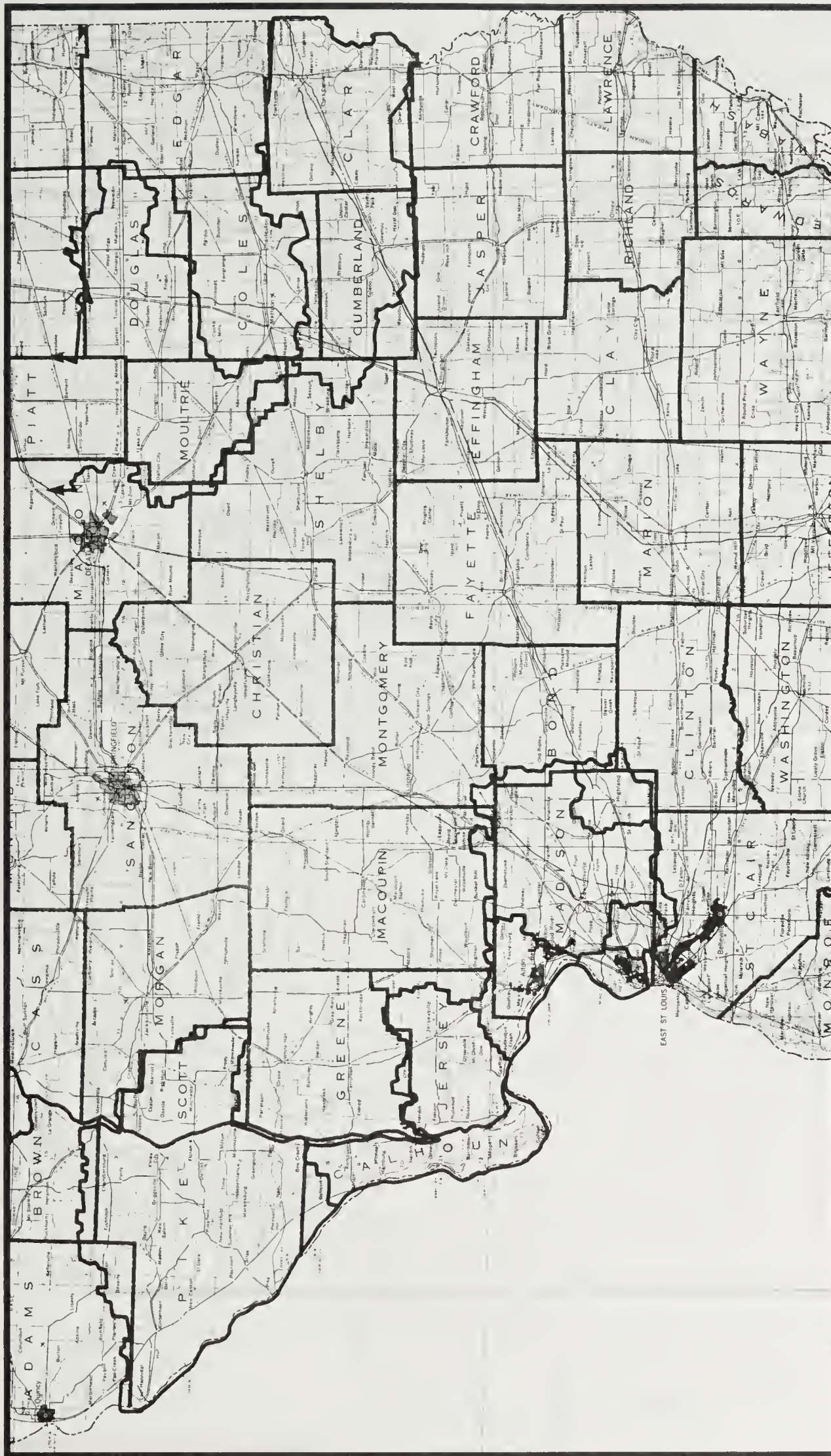
FIGURE B-8
 LOCAL 911 SYSTEM AREA ALTERNATIVES
 — SUBCOUNTY SYSTEMS —
 SOUTHERN ILLINOIS

SD-4477-9



SD-4477-10

FIGURE B-9
LOCAL 911 SYSTEM AREA ALTERNATIVES
— SUBCOUNTY AND MULTICOUNTY SYSTEMS —
NORTHERN ILLINOIS



SD-4477-11

FIGURE B-10
 LOCAL 911 SYSTEM AREA ALTERNATIVES
 – SUBCOUNTY AND MULTICOUNTY SYSTEMS –
 SOUTH-CENTRAL ILLINOIS

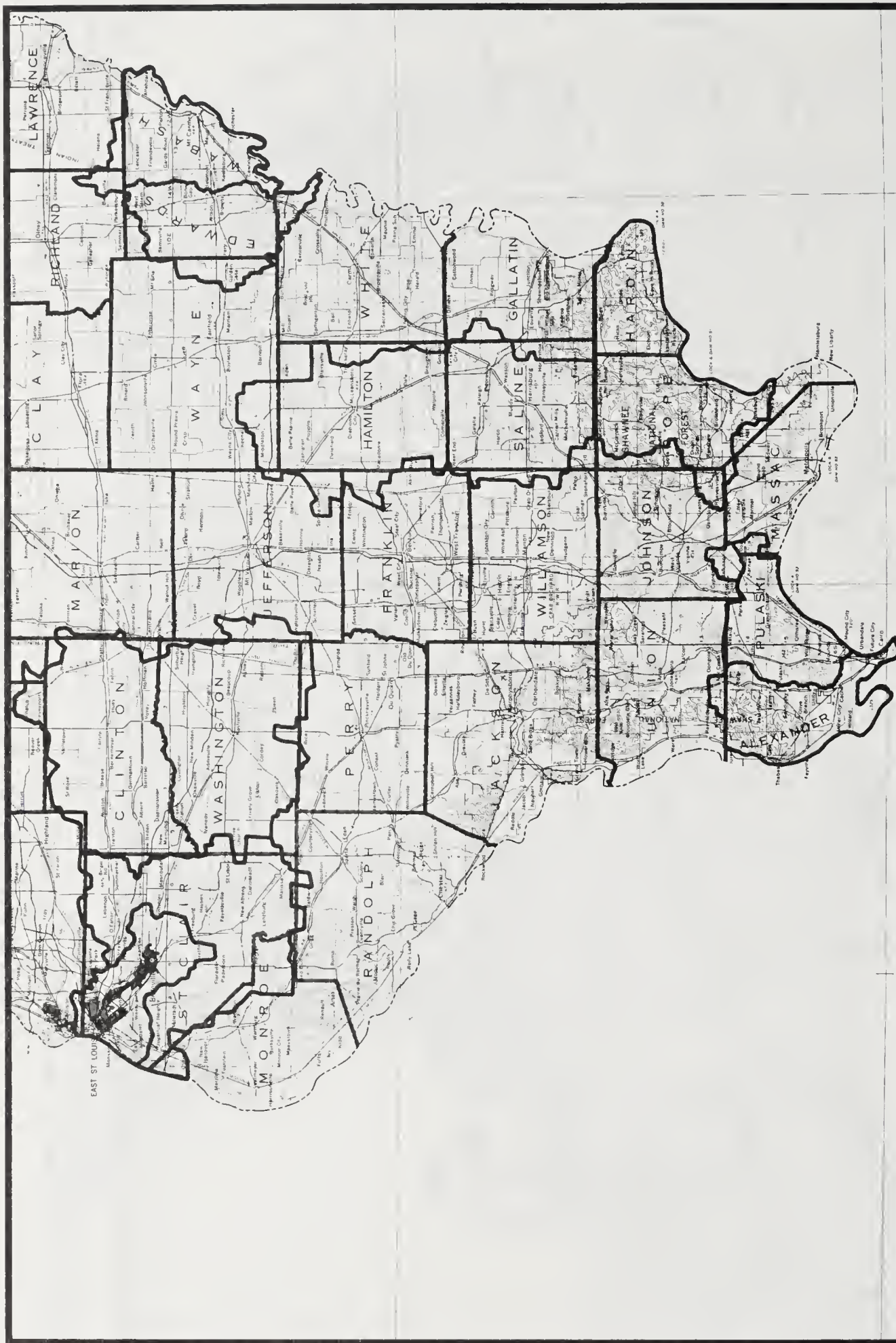
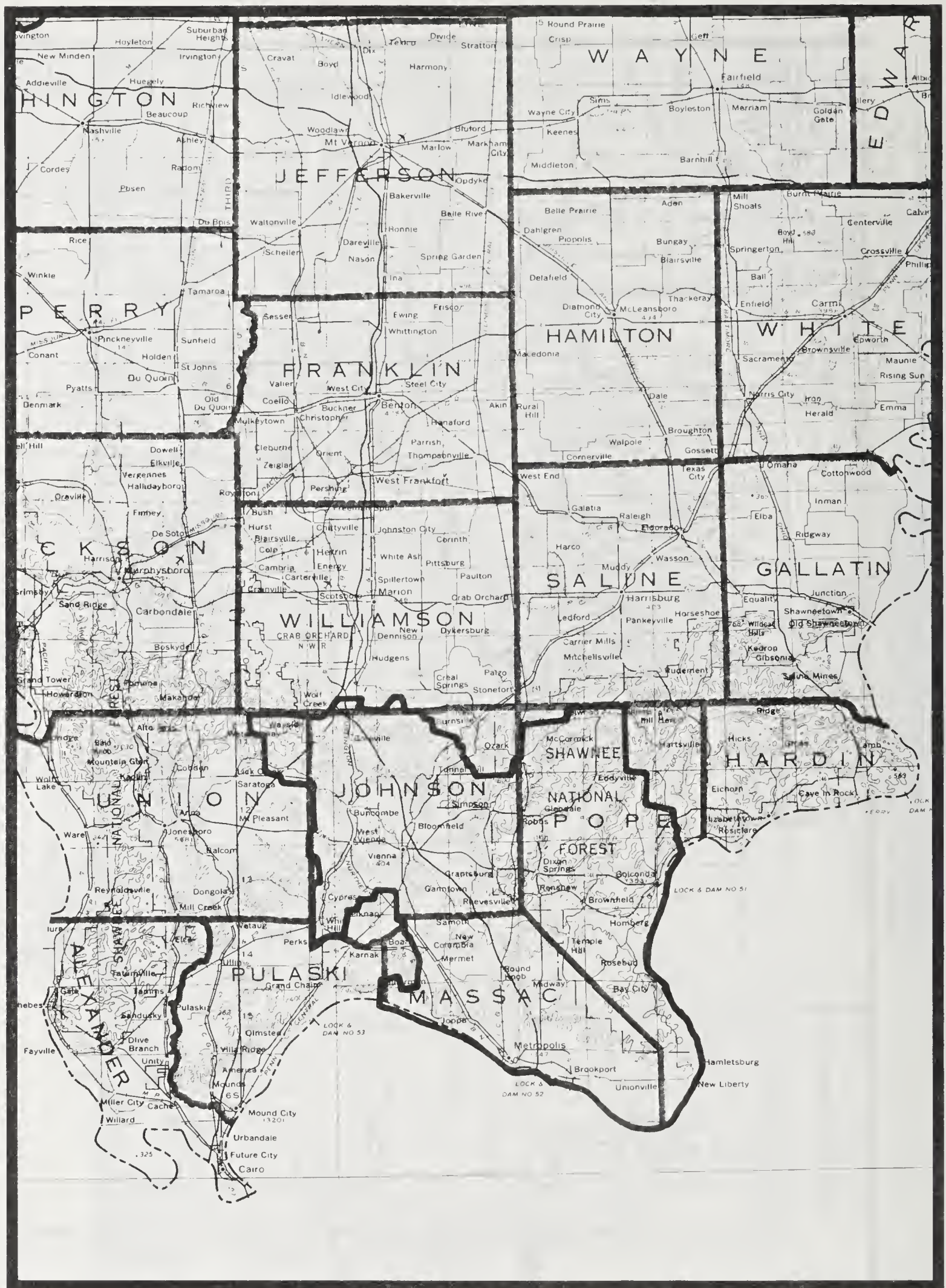


FIGURE B-11
 LOCAL 911 SYSTEM AREA ALTERNATIVES
 -- SUBCOUNTY AND MULTICOUNTY SYSTEMS --
 SOUTHERN ILLINOIS

SD-4477-12



SD-4477-14

FIGURE B-13
 LOCAL 911 SYSTEM AREA ALTERNATIVE
 — MULTICOUNTY SYSTEM —
 SOUTHERN ILLINOIS

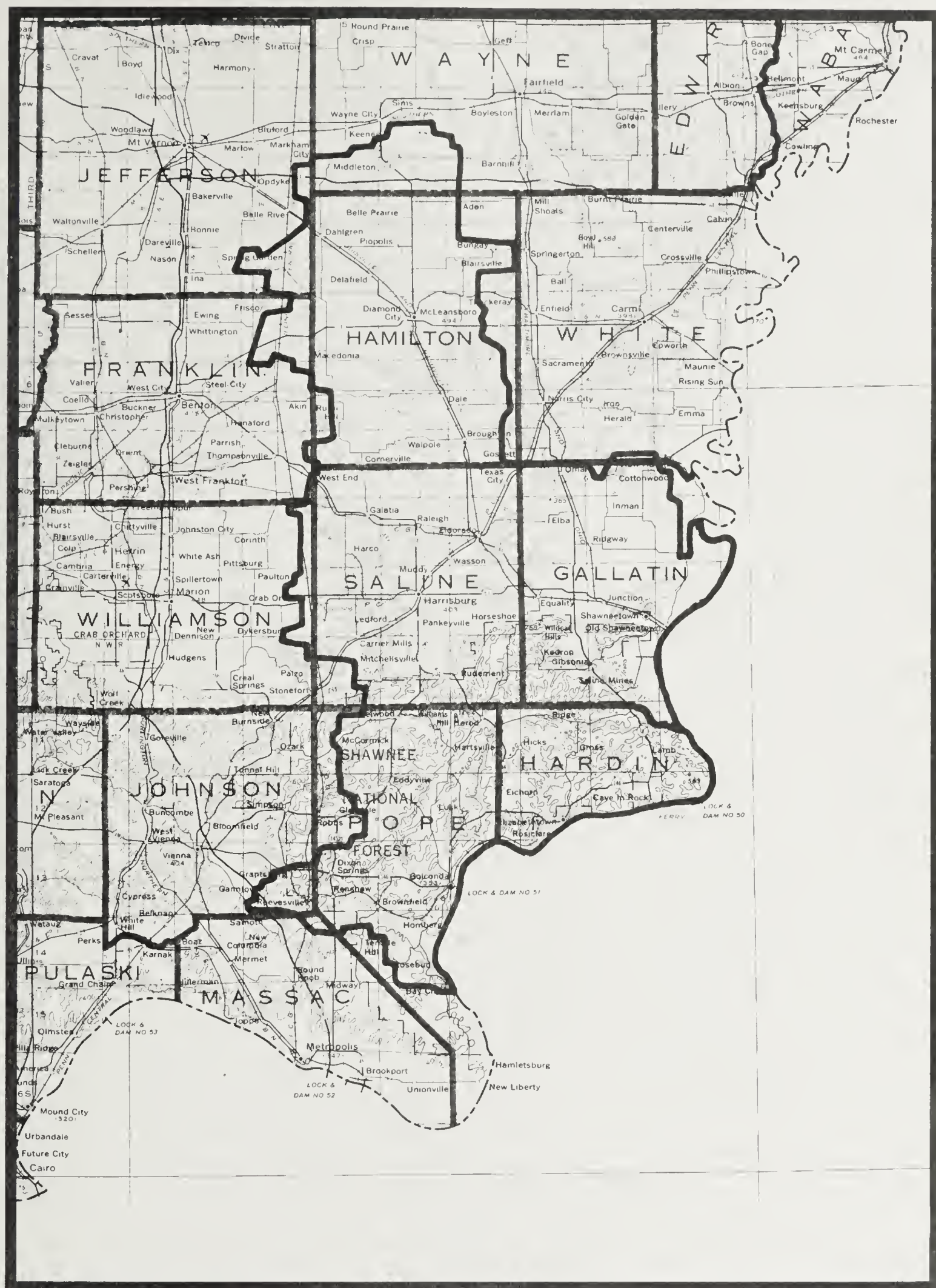


FIGURE B-14
LOCAL 911 SYSTEM AREA ALTERNATIVE
— MULTICOUNTY SYSTEM —
SOUTHERN ILLINOIS

30112122546192-001



FLD00100030

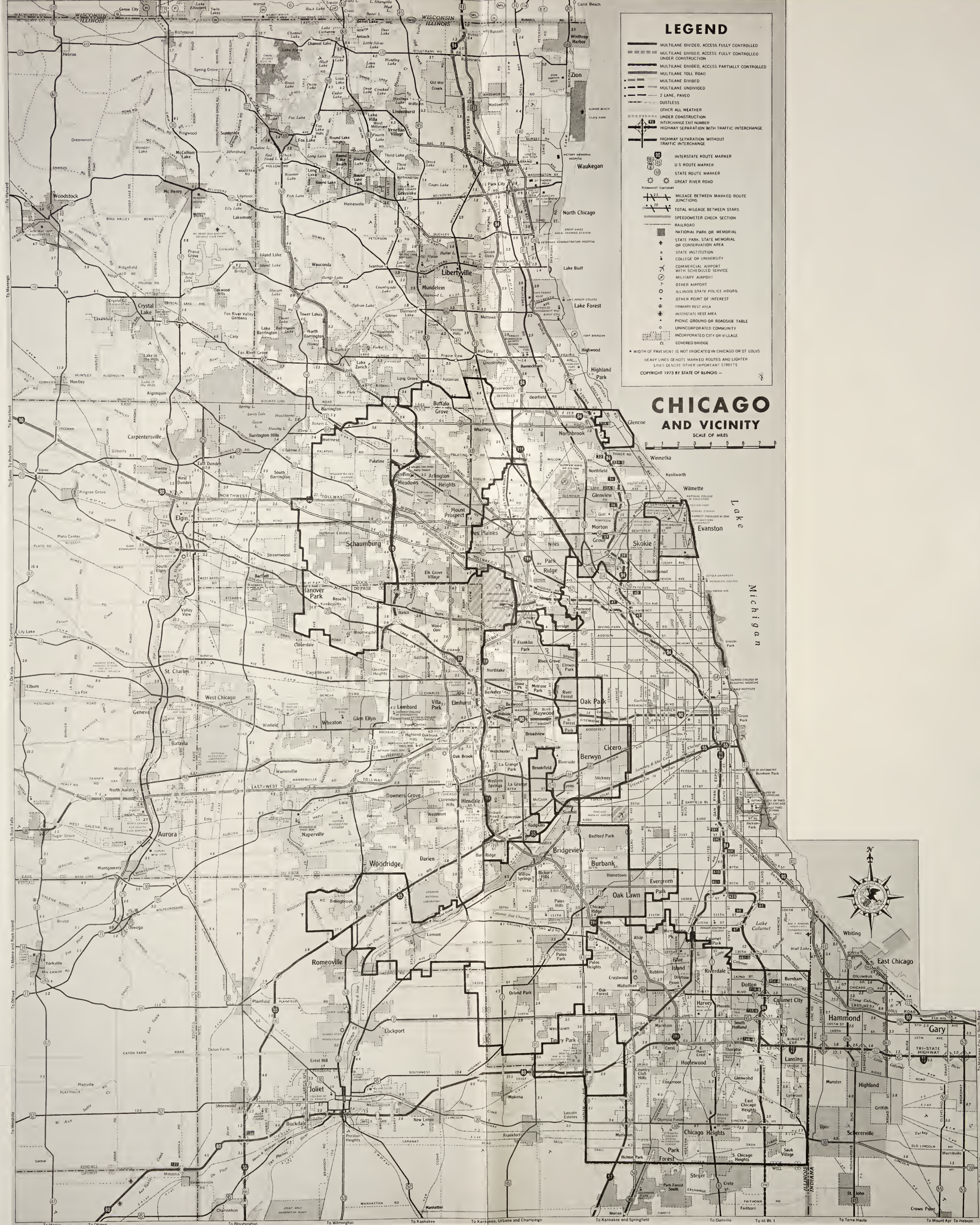


FIGURE B-16
LOCAL 911 SYSTEM AREA ALTERNATIVES
- SUBCOUNTY SYSTEMS -
COOK COUNTY (EXCLUDING CHICAGO)

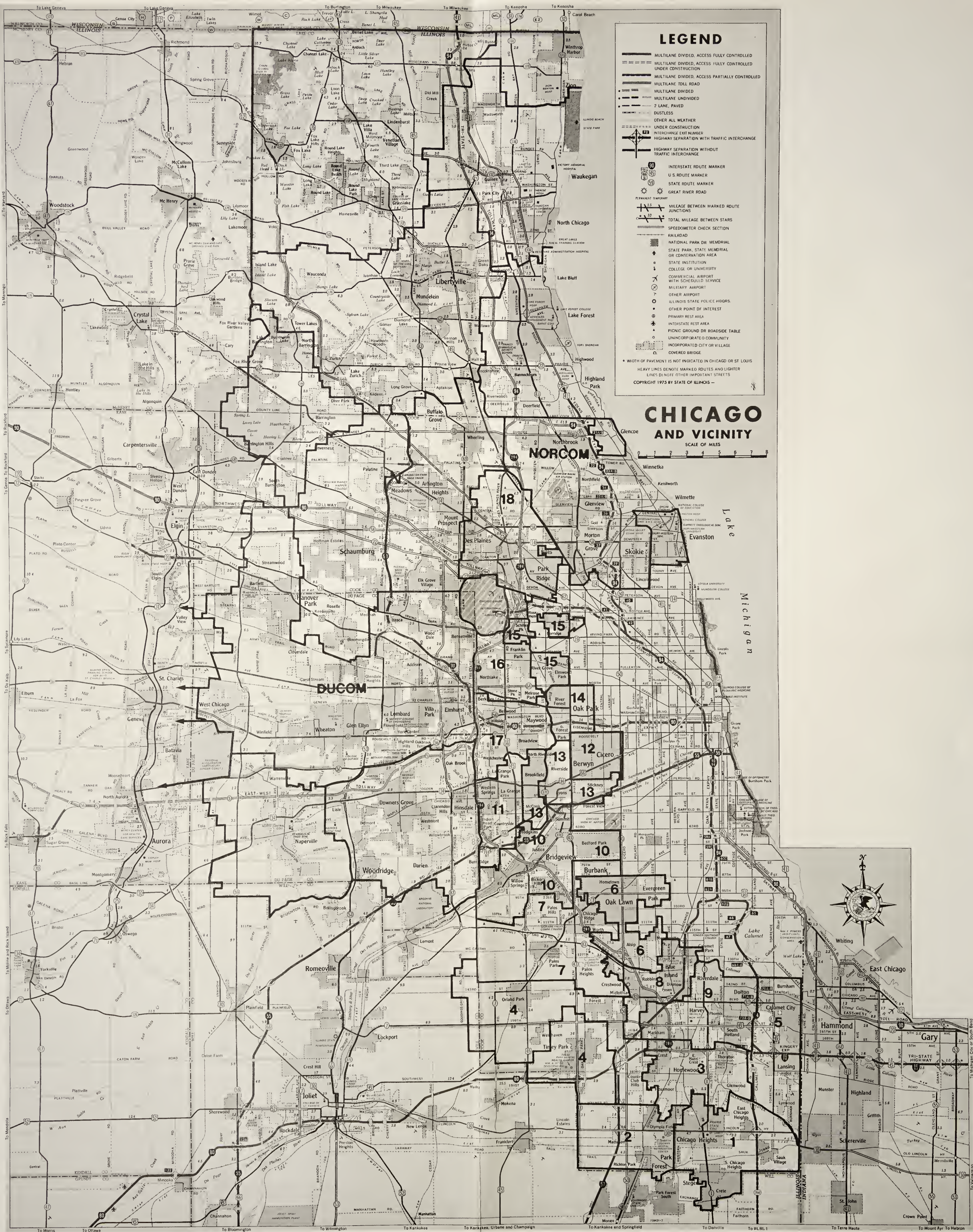


FIGURE B-15
LOCAL 911 SYSTEM AREA ALTERNATIVES
— SUBCOUNTY SYSTEMS —
NORTHEASTERN ILLINOIS

D. Optional 911 Telephone Service Features

There are several telephone service options that are available for use in conjunction with 911 systems. In this section, some of these features and their potential applicability to 911 systems are discussed. None of the following features have been incorporated or costed in the preceding alternatives.

1. Called Party Hold

The Called Party Hold Feature enables the PSAP call answerer to hold a 911 call connection even though the calling party hangs up. This feature allows, in certain predefined emergency situations, a trace to be made by the telephone company to determine the location of the calling telephone.

Called Party Hold can be provided only when the incoming 911 trunks are direct trunked. (Direct versus tandem trunking was discussed in Section B-1 of this appendix.)

2. Forced Disconnect

Forced Disconnect is a feature that automatically disconnects an incoming call when the PSAP call answerer hangs up. This disconnect occurs immediately even if the calling party does not hang up. This feature enables a PSAP to avoid intentional tie-up or jamming of its incoming 911 trunks by persons dialing 911 and refusing to hang up.

If the incoming 911 trunks are direct trunked, disconnect goes all the way to the telephone central office from which the call originates. If the incoming 911 trunks are tandem trunked, disconnect goes only as far as the PSAP's serving central office, thus leaving some portion of the system still tied-up.

3. Ringback

The Ringback feature enables the 911 call answerer to hold and ring back the calling party (without knowing the telephone number) after the connection has been broken by the calling party. It can be used, for example, if the 911 call answerer wants to verify or obtain additional information.

Ringback can be provided only when the incoming 911 trunks are direct trunked. It is also necessary to have the Called Party Hold feature to employ Ringback. This feature is limited to calls from single party lines, and will not work for calls placed from multiparty lines.

4. Idle Circuit Tone Application

The Idle Circuit Tone Application feature provides a means of determining, upon answering a call, whether the calling party has already hung up or is still on the line but unable or unwilling (for some reason) to speak. If the caller hangs up just before the PSAP answers, a distinct tone is heard by the call answerer; if the caller is still on the line, no tone will be heard.

This feature can be provided with either direct or tandem trunking of the incoming 911 trunks.

5. Switchhook Status Indication

This feature allows the PSAP to monitor, by means of supervisory lamps, the status of a calling party being held. This can be a desirable feature, especially if Called Party Hold is provided, because it will help insure that the caller's line is not unnecessarily held up after the emergency call is made.

Switchhook Status Indication can be provided only when the incoming 911 trunks are direct trunked.

6. Visual Identification of Incoming Lines

When the incoming 911 trunks are direct trunked, the names of the originating telephone central offices can be affixed to the incoming lamps to tell from which central office the call is coming. The call answerer then knows from which small geographic area the call is coming. This is useful for a PSAP that receives calls from several central offices.

7. Automatic Number Identification

Automatic Number Identification (ANI) means the ability to identify the telephone number of every caller for telephone company billing purposes. In the language of 911, however, ANI means

automatically forwarding the caller's telephone number to a PSAP which has special equipment to translate the data into a visual display of the caller's number (at the call answerer's console).

ANI can be provided only when the incoming 911 trunks are direct trunked. Each central office comprising the 911 system must also have the capability of automatically identifying and forwarding the calling number to the PSAP.

8. Automatic Location Identification

The Automatic Location Identification (ALI) feature uses the ANI feature and expands upon it by using the caller's telephone number to search a computer data file. The computer file contains an address or location coordinate for every telephone number. Both the caller's number and his location are forwarded to the PSAP and are then displayed at the call answerer's console.

This feature requires that the incoming 911 trunks be direct trunked.

9. Cost of Optional Features

The optional features discussed above have not yet been tariffed by all telephone companies in Illinois. However, for planning purposes, a cost of \$6 per month per incoming 911 trunk can be assumed for each of the first five features discussed above (Called Party Hold, Forced Disconnect, Ringback, Idle Circuit Tone Application, and Switchhook Status Indication). There may be no initial cost. The telephone company representative(s) on the local 911 committees can supply complete information as to the availability and cost of these features.

There may be no additional cost for the Visual Identification of Incoming Lines feature.

The Automatic Number Identification (ANI) and Automatic Location Identification (ALI) features are still under development by the telephone industry. Costs are not, therefore, yet available for these two features.

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